Technical Report 1166

Cohesion in Military and Aviation Psychology: An Annotated Bibliography and Suggestions for U.S. Army Aviation

Robert L. Grice
Liberty University
Consortium Research Fellows Program

Lawrence C. Katz
U.S. Army Research Institute

June 2005

20050819159

United States Army Research Institute
for the Behavioral and Social Sciences

**U.S. Army Research Institute
for the Behavioral and Social Sciences**

**A Directorate of the Department of the Army
Deputy Chief of Staff, G1**

**ZITA M. SIMUTIS
Director**

Technical Review by

David M. Johnson, U.S. Army Research Institute
Angela I. Karrasch, U.S. Army Research Institute

NOTICES

REPORT DOCUMENTATION PAGE

1. REPORT DATE (dd-mm-yy) June 2005	2. REPORT TYPE Final	3. DATES COVERED (from. . . to) October 2003 – September 2004

4. TITLE AND SUBTITLE Cohesion in Military and Aviation Psychology: An Annotated Bibliography and Suggestions for U.S. Army Aviation	5a. CONTRACT OR GRANT NUMBER
	5b. PROGRAM ELEMENT NUMBER 622785

6. AUTHOR(S) Robert L. Grice (Liberty University), and Lawrence C. Katz (U.S. Army Research Institute)	5c. PROJECT NUMBER A790
	5d. TASK NUMBER H01
	5e. WORK UNIT NUMBER 231

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army Research Institute for the Behavioral and Social Sciences ATTN: DAPE-ARI-IR Lucky Star & Third Avenue Building 5100 Fort Rucker, AL 36362-5354	8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Research Institute for the Behavioral and Social Sciences 2511 Jefferson Davis Highway Arlington, VA 22202-3926	10. MONITOR ACRONYM ARI
	11. MONITOR REPORT NUMBER Technical Report 1166

12. DISTRIBUTION/AVAILABILITY STATEMENT

Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES

Subject Matter POC: Lawrence C. Katz

14. ABSTRACT *(Maximum 200 words):*

Military units rely on cohesive teams for mission success and Soldier safety. Although the U.S. Army has increasingly viewed cohesion as a key to the success of combat operations, a comprehensive review of the cohesion literature yielded few published studies specifically addressing cohesion in military rotary-wing aircrews. The purpose of this review was to examine the cohesion-related literature in military and aviation psychology from the past decade to identify a set of characteristics associated with cohesive teams that can readily be applied to the Army rotary-wing aviation environment. The primary characteristics gleaned from this research are summarized and four qualitative dimensions are suggested that appear to be related to cohesion development. Suggestions for building cohesive Army aviation units are offered. In addition, an annotated bibliography of the key studies from which these dimensions emerged is provided.

15. SUBJECT TERMS

| Cohesion | Teamwork | Army aviation | Military psychology | Aviation psychology | Crew coordination |
| Commitment | Communication | Cooperation | Leadership | Review | |

SECURITY CLASSIFICATION OF			19. LIMITATION OF ABSTRACT	20. NUMBER OF PAGES	21. RESPONSIBLE PERSON
16. REPORT Unclassified	17. ABSTRACT Unclassified	18. THIS PAGE Unclassified	Unlimited	82	Ellen Kinzer Technical Publication Specialist (703)602-8047

Technical Report 1166

Cohesion in Military and Aviation Psychology: An Annotated Bibliography and Suggestions for U.S. Army Aviation

Robert L. Grice
Liberty University
Consortium Research Fellows Program

Lawrence C. Katz
U.S. Army Research Institute

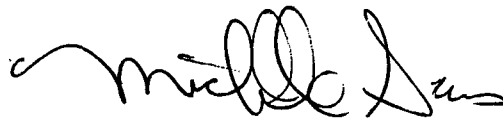**Rotary-Wing Aviation Research Unit**
William R. Howse, Acting Chief

FOREWORD

Cohesion has long been a core concept in psychology and sociology, and has garnered a great deal of attention in the past decade. Military units rely on cohesive teams for mission success and Soldier safety. Aviation researchers have recognized that function and the high-risks they frequently encounter. Although the U.S. Army has increasingly viewed cohesion as a key to the success of combat operations, a comprehensive review of the cohesion literature yielded few published studies specifically addressing the cohesion in military rotary-wing aircrews.

The purpose of this review was to examine these bodies of literature from the past decade and to identify a set of characteristics associated with cohesive teams. The aim was to extract the facets of cohesion that can readily be applied to the Army rotary-wing aviation environment. The primary dimensions gleaned from this research are summarized, and a schematic of cohesion generated from these studies' findings is presented. In addition, an annotated bibliography of the key studies from which these dimensions emerged is provided.

The work described here is a product of the Consortium Research Fellows Program and was supervised by the U.S. Army Research Institute for the Behavioral and Social Sciences, Rotary Wing Aviation Research Unit (ARI RWARU). The findings were briefed to the ARI RWARU Chief and unit personnel in April 2004.

MICHELLE SAMS
Technical Director

COHESION IN MILITARY AND AVIATION PSYCHOLOGY: AN ANNOTATED BIBLIOGRAPHY AND SUGGESTIONS FOR U.S. ARMY AVIATION

EXECUTIVE SUMMARY

Research Requirement:

The U.S. Army rotary-wing aviation community depends upon the cohesion of aircrews for safety and mission success. Members of aviation teams must develop and maintain cooperative team relationships, establish shared mental models, monitor workload levels, exchange mission information, and cross monitor each other's performance in order to effectively coordinate their actions. In response to rising human error-related accident rates, the Army is currently revitalizing its Aircrew Coordination Training Program to reinforce the philosophy that flight tasks can be performed more effectively by the coordinated efforts of cohesive crews. Finding few published studies specifically addressing the development of cohesion among rotary-wing military aircrews, the purpose of this review is to examine cohesion research in the military psychology and aviation psychology literature from the past decade (1993 to 2003). The aim is to extract the facets of cohesion studied by military and aviation psychologists that can readily be applied to the Army rotary-wing aviation environment.

Procedure:

As part of a larger research and development project aimed at enhancing the Army's Aircrew Coordination Training Program, the researchers conducted an extensive review of the cohesion literature. In addition to team cohesion, the concepts of teamwork, leadership, communication, groupthink, productivity, conflict and self-efficacy were searched. Research literature was drawn primarily from *PsycINFO*, the numerous databases managed by *EBSCOhost*, and the Defense Technical Information Center (*DTIC*). Numerous informative articles were found in the fields of military psychology and aviation psychology. The researchers analyzed these studies to determine how cohesive teams are formed and sustained. Suggestions are proposed for U.S. Army rotary-wing aircrews based upon the common findings. The key studies are summarized in an annotated bibliography.

Findings:

The primary dimensions of cohesion gleaned from this review are: (1) Commitment, the degree of loyalty a member holds for the team and team goals; (2) Communication, the exchange of information; (3) Cooperation, the motivation of members to work together in the accomplishment of team goals; and (4) Command, the administrative and managerial role of directing and sustaining teams. Cohesion generally develops in response to the intentional actions of team leaders, particularly in their reinforcement of goals and norms and their emphasis upon ongoing training.

Utilization ad Dissemination of Findings:

As the military community places increasing emphasis on group-level decision making, it will be imperative to understand critical team processes and to implement effective strategies for building cohesive teams. The foundation of these strategies should be empirically based and comprehensive, assuring that all necessary and sufficient cohesion dimensions are considered. This report can assist those team-building efforts in the selection of appropriate design and implementation initiatives.

COHESION IN MILITARY AND AVIATION PSYCHOLOGY: AN ANNOTATED
BIBLIOGRAPHY AND SUGGESTIONS FOR U.S. ARMY AVIATION

CONTENTS

List of Tables

List of Figures

COHESION IN MILITARY AND AVIATION PSYCHOLOGY: AN ANNOTATED BIBLIOGRAPHY AND SUGGESTIONS FOR U.S. ARMY AVIATION

Introduction

Cohesion has been a concern of military leaders throughout time (Siebold, 1999). Ancient accounts of armies overcoming overwhelming odds through teamwork have served to suggest a link between cohesion and performance emphasizing the benefits of quality leaders and adopting team goals. Prior to World War II cohesion was perceived to result from authoritarian leadership, training together, living together, and functioning in an uncertain environment that was believed to promote bonding among members in order to survive. Cohesion was an ambiguous, descriptive term that highlighted the importance of leadership, pride, sense of purpose, mutual trust, confidence, primary group functions, and teamwork (Siebold).

Cohesion research has experienced tremendous advances since World War II. Dion (2000) traces the evolution in describing cohesion from ambiguous forces that exert pressure on groups to remain intact to the more advanced approach of conceptualizing cohesion as an emergent and multidimensional construct that can be empirically measured. Organizational psychology and sports research have greatly contributed to the reconceptualization of cohesion through the recognition that task and interpersonal dynamics appear related to performance (Carron, Colman, Wheeler, & Stevens, 2002). In general, cohesion can be defined as "a dynamic process that is reflected in the tendency for a group to stick together and remain united in the pursuit of its instrumental objectives and/or for the satisfaction of member affective needs" (Carron, Brawley, & Widmeyer, 1998, p. 213). These findings related to cohesion are applicable to rotary-wing aircrews even though they face unique risks and require levels of quality teamwork that might exceed other types of teams.

Aircrews are typically small, experience high risks, and rely upon interdependent input from team members (Salas, Burke, Samman, 2001b) and the quality of this cohesive teamwork can determine mission success (Salas, Fowlkes, Stout, Millanovich, & Prince, 1999). Prince and Salas (1993) proposed Army aviation's research of cohesion should consider "the special circumstances of the rotary wing tactical missions and the experience level of the aviators who were to receive the training" (p. 351). Recognizing the unique nature of Army rotary-wing aircrews, cohesion in these teams is defined as an emergent characteristic resulting from the multifaceted interaction of task and interpersonal dynamics related to the level of task commitment, member cooperation, effective communication, and quality leadership present within the crew. While this definition appears appropriate for Army rotary-wing aircrews it may not be generalizable to other types of teams.

Purpose

Cohesion has garnered much research attention within military and aviation psychology in the past decade. For example, Salas, Burke, Bowers, and Wilson (2001a) cite numerous studies that attribute aviation accidents and mishaps to lapses of crew cohesion. The result has been increased interest in developing and evaluating teamwork-training programs that can foster cohesion and improve performance given the high stress and frequent interaction demands

associated with cockpit crews. Ongoing research continues to explore the evolution of cohesion as technology changes and new generations of aviators require new training strategies to promote teamwork. There is a need to apply this research to the rotary-wing cockpit since technology and teamwork structures are changing within the Army. Therefore, this review examines the military psychology and aviation psychology literature from 1993 to 2003, to identify characteristics associated with cohesive teams and to apply these principles, where possible, to the unique environment in which Army helicopter aircrews operate.

Method

In exploring the role that cohesion might play in assisting coordination efforts of rotary-wing aircrews, ARI conducted a review of the peer-reviewed literature in military and aviation psychology. Our review included a search of *EBSCOhost, PsycINFO,* AND *DTIC.* The terms "team" and "group" are used interchangeably, even though the use of *team* often involves a focus on collective outcomes while the use of *group* generally focuses on matters related to the individual or interpersonal dimensions of a collective body (Knouse, 1998; Paris, Salas, & Cannon-Bowers, 2000). Table 1 summarizes the keywords employed in the conduct of this review.

Table 1

List of Keywords

Cohesion, teamwork, or crew and …		
Commitment	Communication	Leadership styles
Crew coordination	Morale	Decision-making
Feedback	Mental models	Training
Aircrews	Diversity	Cooperation
Social cohesion	Task cohesion	Performance
Adaptability	Responsibility	Conflict
Information exchange	Roles	Cross-training
Trust	Performance monitoring	Leadership qualities
Self-efficacy	Collective efficacy	Communication constraints
Team identification	Social exchange	Stress
Leader personality	Leader values	Motivation

The annotated bibliography provides a representative sample of the military and aviation research from 1993 to 2003 that is applicable to the Army helicopter environment since Army helicopter aircrews are unique teams that function in a technical environment and with high risk factors (Salas et al., 2001b). Crew coordination research has identified certain behavioral markers (e.g., decision-making, communication, leadership) commonly associated with effective aircrews. The literature presented in this review is representative of the vast amount of literature that exists pertaining to different aspects of teamwork among military and aviation teams.

Our survey of the research found that much of the information and constructs related to cohesion in military aircrews fit under at least one of four dimensions. The dimensions include *commitment, communication, cooperation*, and *command*. While these dimensions are not empirically generated, they do seem to appear in research findings. We are careful to note that by identifying these four dimensions we are not proposing a new model to explain the development of cohesion. Rather, we are providing a qualitative review of the literature related to cohesion among military and aviation teams and are suggesting a taxonomy representing broad domains of research findings that appear relevant to creating conditions where cohesion will likely emerge within teams. The four dimensions cited in this report are qualitative descriptors and will be identified interchangeably as antecedents, components, or aspects depending upon the context where found. Table 2 provides a brief description of how these dimensions are defined in this report.

Table 2

The Four Dimensions of Cohesion

• Commitment	The level of loyalty a member holds for the team and team goals
• Communication	The clear exchange of information
• Cooperation	The motivation to work together in the accomplishment of team goals
• Command	The administrative and managerial role of directing and maintaining teams as they progress in accomplishing established goals

The following summary provides a cross-section of sources from military and aviation research and explores the four dimensions of cohesion defined in Table 2. Findings are applied to Army aviation with a comparison between the four dimensions of cohesion cited in this review and the Army's Crew Coordination Objectives (CCO). A discussion section identifies limitations and suggests future research. Finally, an annotated bibliography presents findings pertinent to each of the four dimensions.

Findings

Military and aviation research provides a vast resource of information concerning cohesion and teamwork. Both fields of research recognize that cohesion is an emergent quality resulting from specific behaviors within the team such as: a) commitment to task that motivates interaction leading to increased collective belief or efficacy in the team's ability to be successful (Shamir, Brainin, Zakay, & Popper, 2000); b) cooperative participation that increases bonding and creates expectations of member responses under stress (Baker & Salas, 1996; Cannon-Bowers, Salas, & Converse, 1993); c) collaborative and open communication that enhances situational awareness (Zaccaro, Gualtieri, & Minionis, 1995); and d) effective leadership that demonstrates interpersonal concern for the team and task-related knowledge (Zaccaro, Rittman, & Marks, 2001). This section briefly summarizes key findings from military and aviation psychology. Specific studies are presented more comprehensively in the annotated bibliography that follows (Appendix A).

Cohesion is commonly accepted as having a positive influence on Soldier performance (Siebold, 1999). Meta-analytical support exists that suggests a positive link between cohesion and Soldier perceptions of well-being, job satisfaction, and performance (Oliver, Harman, Hoover, Hayes, & Pandhi, 1999). Griffith (2002) reported that cohesion builds Soldier identification with the unit, reduces the likelihood of attrition, and enhances perceptions of combat readiness. Cohesion's positive influence leads to increased perceptions that the team can be successful (Shamir et al., 2000).

The functional demonstration of cohesion is typically found in teamwork (Paris et al., 2000). Identifying characteristics that result in teamwork has led to numerous suggestions of behaviors that teams should model. The assumption is that teams sharing cohesion-building characteristics will experience greater morale and collective efficacy, leading to greater perceptions of the overall performance of the team (Shamir, et al., 2000). Recognizing the presence of certain behaviors that seem to enhance cohesion has led to the task of designing teamwork-training programs that instill these behaviors and attitudes (Paris et al., 2000). Militello, Kyne, Klein, Getchell, and Thordsen (1999) reviewed teamwork models and identified four components: a) team competencies, b) team identity, c) team planning and decision-making, and d) team self-management. Considerable research from the military and aviation fields has identified teamwork concerns such as adaptability, situational awareness, performance communication and feedback, leadership/team management, interpersonal relations, and cooperative decision-making (Cannon-Bowers, Tannenbaum, Salas, & Volpe, 1995; Salas, Burke, & Cannon-Bowers, 2000).

Military cohesion research has historically adopted two different approaches in studying cohesion and performance (Siebold, 1999). The early approach involved a medical-model orientation and was adopted by the Walter Reed Army Institute of Research (WRAIR) as well as the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI). The medical model examined cohesion from the perspective of identifying symptoms, making a diagnosis, prescribing a treatment, and following up with the results. WRAIR research found that cohesion was an emergent characteristic that resulted from positive interactions, shared values, and common experiences (Ingraham & Manning, 1981). Certain interpersonal traits are essential for teams to experience the necessary ingredients of teamwork, including trust, loyalty, sense of pride and high collective efficacy in the team (Marlowe, 1985). The byproduct of these traits will be greater morale and enhanced commitment (Siebold).

ARI eventually broke with WRAIR and developed a training orientation to studying cohesion emphasizing outcomes such as performance evaluation (Siebold, 1999). The training orientation evaluates performance from existing training programs and then modifies existing programs to see if improved performance results. The influence of social *forces* (policies, regulations, norms) is one consideration in the assessment process since they can influence the quality of cohesion that results (Siebold, 1987, 1993). ARI's research proposed that cohesion arises from three levels – horizontal, vertical, and organizational. Horizontal cohesion consists of peer relationships and teamwork. Vertical cohesion is the relationship between leaders and their subordinates. Organizational cohesion includes pride, attainment of needs and goals, and

the presence of shared values. The input of these different levels converges to augment or oppose the emergence of cohesion (Siebold).

Aviation Research

Aviation Psychology has emerged as a research field in its own right largely due to the unique environment in which aircrews function. Salas et al. (2001b) described aircrews as *command and control teams*, because they are small and unique organizational teams that possess unique risk factors and require a high degree of quality interaction, often in the presence of high-stress conditions. Reviews of mishap reports revealed that many aviation accidents were attributable to teamwork failure (Helmreich, Merritt, & Wilhelm, 1999). Many of these accidents occurred because fears of appearing incompetent within the team resulted in communication constraints (Brown & Moren, 2003).

A strategy for improving cohesion among aircrews is to provide teamwork training programs such as Crew Resource Management (CRM). CRM targets identified behaviors thought to promote teamwork among aircrew members. The behavioral skills covered include: a) mission analysis, b) decision making, c) communication, d) adaptability/flexibility, e) situation awareness, f) leadership, and g) assertiveness (Prince & Salas, 1993). The benefits gained through behavior-based teamwork training include improved crew attitudes (Salas et al., 1999), enhanced performance (Leedom & Simon, 1995), and greater error management (Helmreich et al., 1999). Similar training has proven effective with tank crews (Gayman, Gentner, Canaras, & Crissey, 1996) and civilian aircrews (e.g., Mearns, Flin, & O'Connor, 2001).

Two primary goals of teamwork training programs are to improve cohesion and to develop the ability to manage errors (Helmreich et al., 1999). If learning to manage crew error is a goal, then identifying behaviors that mitigate error through improved teamwork merits further research. Research has shown that crew safety can greatly increase when crews respond to potential threats with adequate situational awareness, collaborative problem-solving, and coordinated responses (Helmreich, Wilhelm, Klinect, & Merritt, 2001). Since coordinated teamwork plays such a significant role, the effort to identify teamwork behaviors has led to the identification of over 130 different teamwork enhancing skills divided into eight categories: adaptability, shared situational awareness, performance monitoring, interpersonal relations, communication, leadership, coordination, and decision-making (Cannon-Bowers et al., 1995).

A core requirement for effective teamwork among aircrews is a mutually shared understanding of behaviors or the knowledge, skills, and attitudes (KSAs) necessary for effective teamwork (McIntyre & Salas, 1995). Salas et al. (2001b) suggest that the familiarity resulting from repeated and positive member interactions leads to the creation of shared mental models. Shared mental models create a form of implicit coordination that can enable the crew to continue to function effectively even under high-workload conditions when explicit communication often decreases. Shared mental models contain individual assumptions, beliefs, and perceptions about other team members and the team as a whole (Klimoski & Mohammand, 1994) that can allow individual team members to adapt to changing conditions and potentially assist other members in completing tasks (Salas et al., 2001b). Klimoski and Mohammand stress that members need to

be aware of the mental models they share so that breakdowns in teamwork will not occur due to faulty expectations.

Four Dimensions of Cohesion

The antecedents of cohesion can vary according to the context in which the team functions. For instance, the goals and risks for military units will likely be different from the production demands of organizational teams and the win/loss evaluations of sports teams. This review of cohesion in military and aviation psychology found that cohesion is a multifaceted construct that could be described as emerging from four primary antecedent dimensions (Figure 1). These dimensions influence the level and quality of cohesion that emerges within teams. They appear to capture the essence of our definition for cohesion among Army rotary-wing aircrews as representing a mixture of task and interpersonal dynamics.
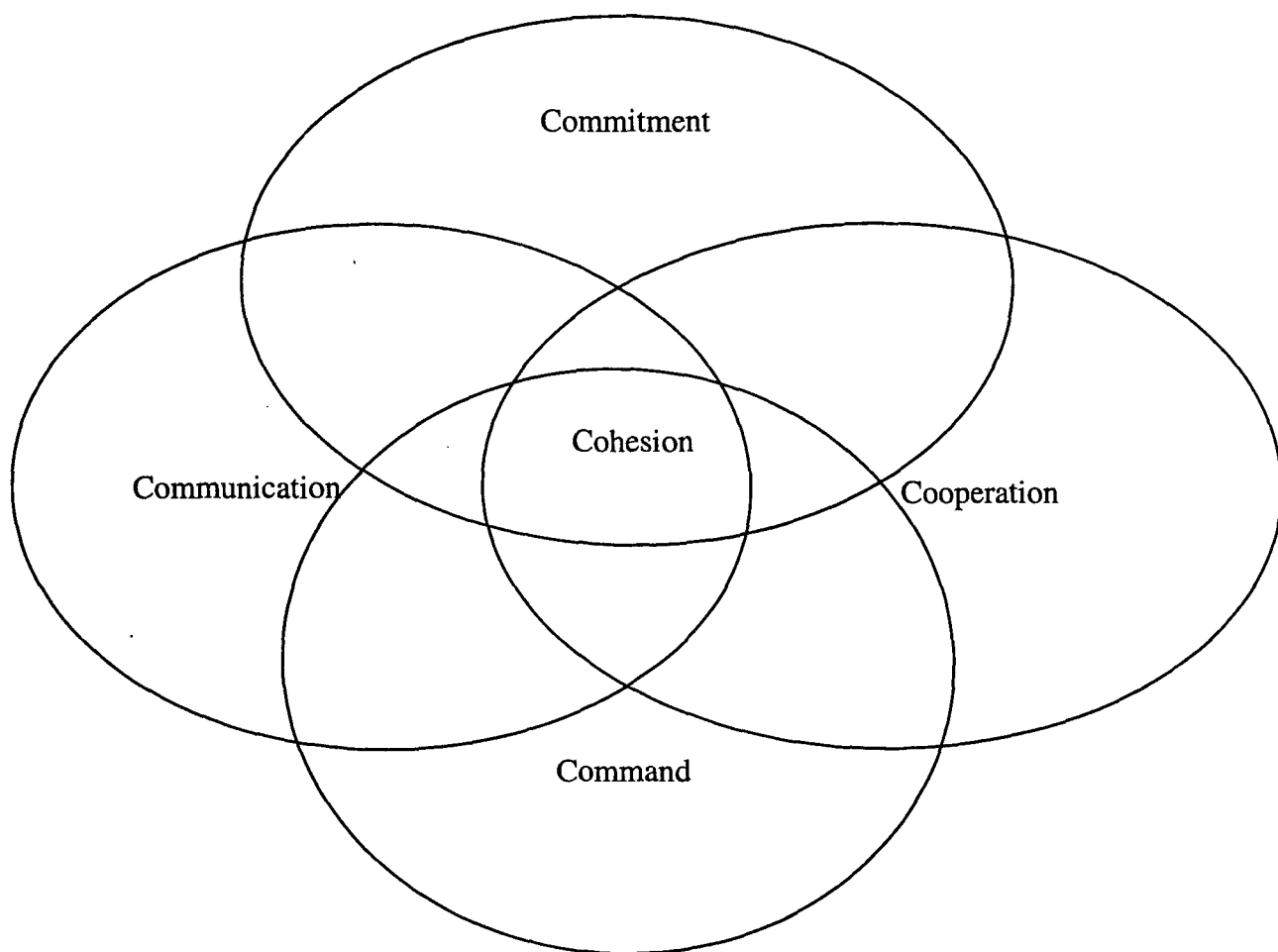

Figure 1

Four general dimensions of cohesion

Commitment

Commitment is the degree of loyalty a member holds for the team and team goals. Perceptions of commitment begin early in the initial decision to respond to recruitment efforts because the team promised to provide desired outcomes (Hogg & Abrams, 1993). The process of identifying with the team and gaining collaborative experience through accomplishing tasks helps to increase commitment as these positive interactions enhance collective efficacy in the team's ability (Shamir et al., 2000).

Commitment reflects individual belief in the efficacy of the team can play an important role in commitment decisions over time (Jordan, Field, & Armenakis, 2002). Collective efficacy in military units has been linked to perceptions of combat readiness and morale (Shamir et al. 2000). Research involving multinational forces serving as peacekeepers found that collective efficacy could vary at different levels (i.e., primary team level vs. organizational level) within the units assigned to places such as Bosnia-Herzegovina (Karrasch, 2003).

Commitment decisions include assessments of attractability between the team and potential members. Attractability from the perspective of potential members is often based upon judgments of potential benefits to be gained through team membership. Attractability from the perspective of the team in selecting potential members often involves a process of matching individual skills with the demands of the teams. The aviation field, for example, has experimented with skills testing in pilot selection (Hedge, Bruskiewicz, Borman, Hanson, Logan, & Siem, 2000). The assumption is that preliminary testing will improve member placement efforts and enhance performance. Successful teams often begin to create a satisfaction spiral with productivity fueling member satisfaction as long as member needs continue to be met.

A primary concern in maintaining commitment is that levels of cohesion can fluctuate over time as the team evolves (Bartone & Adler, 2000). Commitment can diminish if the team experience becomes negative. Soldier perceptions of the mission seem to influence subsequent feelings of commitment, morale, and responsibility (Britt, 1996). Stress (Griffith, 2002) and negative interpersonal dynamics (e.g., conflicts, feelings of betrayal) can quickly erode commitment to the team. A loss of confidence in team leadership can be a significant setback to maintaining team commitment. Task-related failures or dysfunctional social dynamics can cripple the team if it leads to a member's withdrawal of participation in the team, the creation of factions, the adoption of alternative goals, or rebellion against team leadership (Keyton, 1999).

Organizations like Army aviation can implement strategies that enhance member commitment to their teams. For example, the aviation industry has implemented safety cultures as a method for improving commitment among aviators because they potentially enhance performance and member commitment through demonstrating organizational commitment to crew welfare and safety (Wiegmann, von Thaden, Mitchell, Sharma, and Zhang, 2003). Wiegmann et al. (2003) offer that effective safety cultures include five components: a) organizational commitment, b) management involvement, c) employee empowerment, d) reward systems, and e) reporting systems. Their study found that pilots and supervisors rated all five factors as important, but significant variance was reported among pilot assessments of safety cultures.

Communication

Communication involves the gathering, managing, and dispersing of information to the team. Clear communication provides goal clarity, conveys situational awareness, and reinforces team norms. Military and aviation psychology have demonstrated the need for communication to be clear and frequent, and for decision-making to allow for feedback. Military teams often experience high-stress environments where effective communication can mitigate risks to safety and mission success. The effectiveness of team communication will be governed in large part by the leader's emphasis on developing and reinforcing the lines of communication within the team. This will be achieved as teams practice feedback, information exchanges, and decision-making.

Feedback, whether debriefing or as performance monitoring, allows teams the opportunity to evaluate past performance to determine if adjustments need to be made (Bailey & Thompson, 2000). Productive feedback requires a basic understanding of relevant task and social skills that are needed in the cockpit (Brannick, Prince, & Salas, 2002). Feedback is one aspect of information exchange and serves to maintain situational awareness and foster decision-making.

Decision-making is an integral function of team communication. Changing conditions can produce situations where changes to plans must be made. Strategic planning can be difficult if decisions are made at different hierarchal levels within the organization because delays and information gaps can reduce productivity and increase risks (Hollenbeck, Ilgen, LePine, Colquitt, & Hedlund, 1998). Thomas and Jansen (1996) reported that the growing trend in organizations, including the military, is to move away from hierarchal decision-making to team self-management due to efficiency concerns. This shift in decision-making strategy requires that team members assume new roles and responsibilities for ensuring team goals are accomplished.

Research suggests the most effective teams possess quality decision-making ability because they have created shared mental models (Cannon-Bowers et al., 1990; 1993). Leadership plays an important role in creating these mental models when they foster a team environment that encourages frequent interaction and practice (Zaccaro et al., 2001). Shared mental models support team communication because familiarity between members creates expectations of reactions to times of stress or high workload when communication generally decreases. Mental models allow for reasonable assumptions between members to fill information gaps when quick decisions must be made.

Communication can diminish in teams due to stress or increased workload. Stress often results in decreased decision-making quality because direct communication exchanges often diminish (Zaccaro et al., 1995). The negative influence of stress on decision-making can be mitigated through training, input, and strengthening member relationships. Cross-training team members can develop an implicit, though limited, understanding of each member's role (McCann & Baranski, 2000). Encouraging member input in decision-making can maintain member involvement in team processes and mitigate the negative influence of increased workload (Zaccaro et al., 1995). Promoting frequent interactions can strengthen member bonding, identification with the team, and understanding of member roles. Frequent, positive member interactions lead to implicit coordination that will enhance decision-making ability (Kleinman & Serfaty, 1989).

A leader's failure to encourage communication in the team can lead to verbal constraints that increase risks for the team (Grice & Katz, 2001). Communication constraints significantly weaken the mental models that develop since the team communication present does not allow for critical feedback and discourages member input that challenges the homeostasis of the team or team leadership. A study of the influence of expressed social support on teams under high workload or with high levels of role ambiguity found that low or unexpressed social support was associated with high levels of distress (Bliese & Castro, 1999). Therefore, Army aviation leaders are encouraged to incorporate and model open communication in the cockpit as a tool for mitigating risks.

Cooperation

Effective teams rely upon teamwork to accomplish goals. Research has found that many teamwork competencies are identifiable skills and are trainable strategies (Cannon-Bowers & Salas, 1998). Teamwork is achieved as members begin to cooperate and coordinate their efforts by maintaining a task-oriented focus while mitigating the dynamics of interpersonal relationships within the team (Baker & Salas, 1996). Teamwork training packages have developed in fields such as aviation and research has sought to identify ways to export teamwork training skills to varied organizational contexts where teams function (Flin & Martin, 2001). These training packages often experience developmental changes as new technology can change the dynamics at work within the team (Helmreich et al., 1999).

The task-oriented emphasis of cooperation highlights factors that contribute to a team's accomplishment of goals. This occurs through attributes such as role assignments, shared mental models, and feedback. These attributes are captured in the skills stressed by CRM, which has been found to improve performance, while reducing human error, among teams such as aircrews (Nullmeyer & Spiker, 2003).

The interpersonal feature of cooperation involves a commitment among members to mitigate social distractions. Unresolved conflicts can reduce task commitment as members seek to restore emotional homeostasis in the team. Diversity can serve as a distraction if members fail to recognize the benefits of diverse skills and experiences as a positive contribution to the team (Knouse, 2001). Perceptions of disloyalty or betrayal by team members or team leadership can serve to destroy cooperativeness. If members do succumb to social distraction a common response is to overtly or covertly withdraw effort and input in the team.

Cooperation can be encouraged by team history and what the team represents. Historically successful teams generally inspire confidence in those assessing the desirability of membership. Past success can produce assumptions of future success and engender perceptions of stability and confidence in team goals and roles. Early success can promote member bonding and potentially serve to mitigate the negative influence of diversity perceptions (Niebuhr, Knouse, & Dansby, 1994). Successful teams can represent improved status and promise to meet the affective needs of members. Army aviation has the benefit of possessing a successful history as an organization and offers aviators the opportunity to join an elite community of individuals. Building upon these history and status benefits, Army aviation leaders can encourage cohesion by orchestrating early successes, encouraging cooperation, modeling open communication, providing adequate training, and reinforcing the team's sense of efficacy.

Command

Command is an imperative concern for creating cohesion in teams (Bartone, Bjorn, Eid, Brun, & Laberg, 2002). Command, commonly described as leadership, bears much of the responsibility for team outcomes (Popper, 1996). Administrative and managerial oversight of the team rests primarily with leadership including coordinating and managing personnel, managing information, problem-solving, and managing material resources (Zaccaro et al., 2001). Research has found that one of the indicators of effective leadership is the ability of the leader to resolve interpersonal conflicts and maintain interpersonal relationships (Mumford, Zaccaro, Harding, Jacobs, & Fleishman, 2000). Identifying methods for enhancing leadership effectiveness involves consideration of leader-led relationship, leadership styles, and how to maintain effective leadership when teams experience times of stress or change.

The leader-led relationship is the medium through which teams are able to perform. Successful leadership appears to build upon relational bonds between the leader and those being led (Popper, 1996). Leaders encourage bonding when they inspire trust by remaining consistent, promoting openness, stressing fairness, practicing honesty, and attending to the concerns of subordinates (Deluga, 1995). Members identify with leaders that demonstrate influence and competence as the team develops its own sense of identity (Hogg, 2001). Griffith (2002) found that when leaders are supportive and peer relationships are cooperative the result is often identification with the Army that translates into continued commitment and increased perceptions of combat readiness.

The ability of leaders to bond with followers appears to be related to personality traits (Foti, Hauenstein, & Sgro, 1998) and leadership style (Bass, Avolio, Jung, & Berson, 2003). Studies support that personality traits can be related to subsequent performance (Judge & Bono, 2000; Ployhart, Lim, & Chan, 2001). Personality traits related to conveying confidence and competence seem to improve performance and engender respect from followers (Foti et al.). However, Ployhart et al. suggest caution in applying these findings without considering the organizational context. The expectations of leaders in industry will likely be different from military leaders.

Leadership styles can influence leader and team performance (e.g., Bass et al., 2003; Masi, 2000). For example, Keithly and Tritten (1997) suggested that charismatic leaders have the uncanny ability to motivate followers in times of crisis. Charismatic leadership generally restricts decision making to the leader, which can prove disastrous if the leader fails to implement the adjustments required by fluctuating circumstances. Keithly and Tritten concluded that charismatic leadership flourishes in times of crisis or change but wanes when stress diminishes or members become too familiar with the routine of the team. They suggested that form of leadership is more personality-related, situational, and short-term because it appears to be linked to crisis.

Much of military leadership research describes leadership in terms of transactional and transformational styles. Transactional leadership serves as the foundation of military command and provides an exchange function, with member compliance resulting in an exchange for desired commodities such as emotional, status, or financial rewards (Dvir, Eden, Avolio, Shamir,

2002). Punitive measures are often implemented in response to non-compliance, mistakes, and errors (Bass et al., 2003). The benefits of transactional leadership are often gleaned when teams are inexperienced or under stress. Transactional leadership can work well with temporary teams when the task concerns are paramount and social cohesion is not a significant concern because the team will disband once goals are reached.

However, some teams are permanent and finding ways to elicit maximum input from members can require a change in leadership style. Goodwin, Wofford, and Whittington (2001) propose that members contribute more effort to the team when they possess a sense of *implicit contracting,* where the individual perceives that the team or organization values his or her participation in the team. Achieving the goal of motivating greater cooperation among followers requires a style beyond transactional leadership.

Transformational leadership builds upon a foundation of transactional leadership but seeks to lead through inspiration and vision. The primary difference is that transformational leaders earn the loyalty and cooperation of their followers without the imminent presence of rewards or penalties. While some personalities naturally embrace a transformational style (Keithly & Tritten, 1997), a grid of transformational leadership behaviors could encompass three domains: motivation, morality, and empowerment (Dvir et al., 2002). Motivation involves implementing strategies that foster camaraderie and inspire members to go beyond role expectations for the sake of the team. Morality, especially in honesty and fairness, is imperative for leaders if they want to maintain the support of their followers. Empowerment is the willingness to invite collaboration in team functions such as decision-making, feedback, and planning.

Transformational leadership relies heavily on the image of the leader. Rozell and Gunderson (2003) describe the behaviors leaders use to create and maintain their image of competence as *impression management.* Behling and McFillin (1996) offer that crucial leader behaviors include displaying empathy, dramatizing the mission, orchestrating early success, reinforcing collective efficacy, and projecting confidence. Other impression management behaviors of transformational leaders include showing personal interest in other members, complementing and praising performance, and sacrificing for the team while demonstrating high personal performance standards (Rozell & Gunderson).

Times of stress and change can diminish team performance and leader effectiveness. Regardless of the leadership style, leaders face tremendous challenges when their teams experience structural or situational changes. Among the challenges is adapting the appropriate style or mixture of styles to the needs of the team. The military is not immune to change. Shamir and Ben-Ari (1999) discussed the tremendous changes confronting the U.S. military and suggest that leadership behavior will be forced to adapt to changes in tasks, changes in environments, changes in organizational arrangements, and changes in the composition of the force.

The role of ongoing training cannot be discounted. Effective leadership may be influenced by personality, but skills are also needed. Training should include skills related to transactional and transformational leadership. Other skills include interpersonal skills such as listening and personal characteristics such as integrity (Dickson, Smith, Grojean, & Ehrhart, 2001). Preparing

leaders to confront change can suggest other skills that need to be considered. Shamir and Ben-Ari (1999) proposed that leadership education in changing organizations should include among other topics: a) learning to work in teams, b) negotiation and mediation skills, c) cross-cultural studies, d) public relations skills, and e) ethics.

Ultimately, the focus of command research is to produce effective leaders. Effective leaders are imperative in the cockpit and the behavior of highly rated crew leaders will determine the effectiveness of those crews in many cases (Ginnett, 1993). Highly effective leaders, according to crew ratings, were found to exhibit behaviors such as establishing competence, disavowing perfection, and engaging the crew. They also fluctuated in their leadership style from autocratic to participative depending upon the needs of the crew at the time. In summary, highly effective leaders were described as: a) demonstrating social concern as well as task-focused behavior, b) expanding the crew boundaries to include other personnel that can assist the team, c) demonstrating flexible and open leadership styles, and d) emphasizing certain performance norms.

Command failures increase risks to safety and mission success. Ginnett (1993) proposed that one of the most significant mistakes crew leaders can make to undermine a successful crew environment with alternative goals, norms, or restrictive behaviors that motivate members to withdraw effort from the crew. Aircrews stand to benefit when leaders encourage openness and collaboration. While aircrew training might deemphasize rank in the cockpit, the reality is that some degree of reticence to question higher-ranking officers can exist (Merritt, 1995). Shared mental models are a great resource for protecting communication during high workload periods. If these are to develop, leadership must encourage collaboration and cooperation.

Dimensions of Cohesion for U.S. Army Aviation

Examinations of commercial (Helmreich et al., 1999) and military (Peusch & Hicks, 2001) aviation mishap reports from the 1980s have demonstrated that crew error often resulted from poor teamwork under high workload conditions. These accidents resulted in the tragic loss of life and the expensive loss of equipment. In response, the aviation industry has sought to improve cohesion by identifying teamwork-relevant behaviors that should be included in aviator training. This task has not always proven to be simple since research has found that aircrew members often perceive teamwork characteristics differently based upon individual differences and team experience (Baker & Salas, 1996; Bowers, Baker, & Salas, 1994).

Army aviation has addressed teamwork concerns by identifying 13 key dimensions, or "Basic Qualities," of effective aircrews. These dimensions include factors related to communication, such as "Statements and directives are clear, timely, relevant, complete, and verified." Aspects of command leadership are identified such as, "Establish and maintain flight team leadership and crew climate." The importance of creating shared mental models is stressed in statements such as, "Pre-mission planning and rehearsal accomplished."

The Basic Qualities comprise Army aviation's five "Crew Coordination Objectives" (CCO): 1) Establish and maintain team relationships; 2) Mission planning and rehearsal; 3) Establish and maintain workload levels; 4) Exchange mission information; and 5) Cross-monitor

performance. A comparison table (see Table 3) illustrates the similarities between the Army's CCOs and the four dimensions of cohesion this literature review identified.

Table 3

A Comparison of Cohesion Dimensions and Army Aviation's CCOs

Dimensions of Cohesion	Army Aviation's Crew Coordination Objectives
Commitment	Establish and maintain team relationships (CCO 1)
Communication	Exchange mission information (CCO 4)
Cooperation	Mission planning and rehearsal (CCO2) Cross monitoring of performance (CCO 5)
Command	Establish and maintain workload levels (CCO 3)

The Interrelatedness of Cohesion Dimensions

When functioning properly, these four aspects of team functioning interact in a complementary way resulting in cohesion development. For example, commitment is likely to encourage communication and cooperation because committed members will be more likely to invest effort on behalf of the team (e.g., Hogg & Terry, 2000; van Knippenberg & van Schie, 2000). Effective communication can promote commitment to the team and increase cooperation because collaboration and productive feedback contribute to a sense of ownership in team outcomes and increases mutual understanding of member roles, which can improve the likelihood the team will be successful (Merritt, 1995; Rasker, Post, & Schraagen, 2000). Cooperation can enhance commitment perceptions (Lembke & Wilson, 1998) and encourage frequent communication when positive interactions promote future interactions (Lawler, Thye, & Yoon, 2000) and group members perceive their efforts on behalf of the team will result in desired outcomes (Karau & Williams, 1996; Shepperd & Taylor, 1999). Command serves a managerial function in ensuring the team continues to function properly (Zaccaro et al., 2001).

However, these four antecedents of cohesion can become dysfunctional and detract from cohesion. Commitment can erode if members perceive injustice or betrayal by the team or if their team experience proves inconsistent with their expectations. Poor communication or communication constraints, due to status concerns or interpersonal conflicts, can limit information exchanges and result in unnecessary risks or lower productivity. Poor cooperation produces confusion and will likely be symptomatic of other problems within the team related to dysfunctional social or task dynamics and ineffective leadership. Command can become dysfunctional if the leader fails to effectively monitor interpersonal relationships and task performance or fails to maintain the administrative functions required so the team can accomplish its goals.

Though these four dimensions are not empirically validated in this report, the bulk of research findings seem to suggest they are relevant antecedents of cohesion development. Cohesion development occurs over time as team interactions and experiences prove satisfying and successful (Lawler, 2001; Lawler et al., 2000). While each of the four antecedents posit in

13

this report seems to possess its own importance, the role of command might be most critical since leadership will set the tone for how the team will function in accomplishing task goals and managing interpersonal relationships.

Discussion

Cohesion is an important quality of any productive team. Military and aviation teams require high levels of cohesion for effective performance and to reduce safety risks (Salas et al., 2001b). Four general antecedents (i.e., commitment, communication, cooperation, and command) to cohesion are proposed in this report based upon our qualitative review of the literature related to cohesion in military and aviation teams. Commitment is the willingness of individuals to adopt team norms and work towards accomplishing team goals (Lembke & Wilson, 1998; van Vugt & Hart, 2004). Communication is the transfer of verbal and nonverbal information that allows for teams to self-monitor performance (Marks & Panzer, 2004). Cooperation is the willingness of individuals to provide input and to exert effort in the team's pursuit of obtaining goals (Jordan et al., 2002). Command is the leadership role that must balance numerous team functions related to task, interpersonal relationships, and administration so the team can be successful (Zaccaro et al., 2001).

Correcting cohesion problems in teams is not an easy task. A one-size-fits-all approach will not work with every team. However, research has identified strategies that can improve cohesion related to these dimensions:

Diminished commitment can be improved by:

- Maintaining justice perceptions in the team (Murphy, Wayne, Liden, & Erdogan, 2003)
- Periodic evaluations and feedback (Brooks & Ammons, 2003)
- Respectful communication (Tata, 2002)
- Contingent rewards for performance (George, 1995)
- Individual benefit from team outcomes (Karau & Williams, 1995)

Communication problems can be improved by:
- Improving leader-follower rapport (Campbell, White, & Johnson, 2003)
- Leaders modeling openness to feedback (Rasker et al., 2000)
- Rehearsing procedures that clarify communication (Salas et al., 2000)

Cooperation can be improved by:
- Providing ongoing teamwork training (Cannon-Bowers & Salas, 1998)
- Assessing the interpersonal climate of the team (Rempel & Fisher, 1997)
- Enhancing collective efficacy in the team (Shamir et al., 2000)

Command can improve through:
- Ongoing leadership training to develop leadership skills (Ruvolo, Petersen, & LeBoeuf, 2004)
- Learning to apply leadership skills to the fluctuating needs of the team (Salas et al., 2000)

One limitation of this review is that the four dimensions we identified were derived anecdotally, from our reading, rather than empirically based on a statistical factor structure. Another potential limitation is the impracticality of reviewing all of the information available on the subject of cohesion within small teams. Since the availability of research specifically addressing the needs of military rotary-wing aircrews is sparse, we believe this presentation at least suggests themes meriting further consideration in assisting aircrews to become cohesive.

Future research should focus on empirical validation and exploration of the dimensions described in this literature review. For instance, commitment-related research might seek to identify the factors that contribute to self-selection for Army aviation and career decisions about remaining in Army aviation among future aviators. Communication research might consider new ways to encourage cohesion through communication training that encourages productive feedback and frequent information exchanges as technology continues to change in the cockpit. Finally, command research can expand our understanding of what behaviors and attitudes will be most effective in the years to come as individual expectations of leaders are likely to change.

Table 4

List of the Articles Reviewed by Category

Authors	Commitment	Communication	Cooperation	Command
Bailey, L.L., & Thompson, R.C. (2000)		X	X	
Baker, D.P., & Salas, E. (1996)	X			
Bartone, P.T., & Adler, A.B. (2000)				
Bartone, P.T., Bjorn, H.J., Eid, J., Brun, W., & Laberg, J.C. (2002)				X
Bass, B.M., Avolio, B.J., Jung, D.I., & Berson, Y. (2003)				X
Beard, R.L., Salas, E., & Prince, C. (1995)			X	X
Behling, O., & McFillen, J.M. (1996)				X
Bliese, P.D., & Castro, C.A. (1999)		X		
Bowers C.A., Baker, D.P., & Salas, E. (1994)			X	
Brannick, M.T., Prince, C., & Salas, E. (2002)		X		
Britt, T.W. (1996)	X			
Cannon-Bowers, J.A., & Salas, E. (1998)			X	
Davis, W., & Fedor, D.B. (1998)				
Deluga, R.J. (1995)				X
Dvir, T., Eden, D., Avolio, B.J., & Shamir, B. (2002)				X
Flin, R., & Martin, L. (2001)			X	
Foti, R.J., Hauenstein, N.M.A., & Sgro, J.A. (1998)				X
Griffith, J. (2002)	X			
Harriel, D.W. (1997).	X			
Hedge, J.W., Bruskiewicz, K.T., Borman, W.C., Hanson, M.A., Logan, K.K., & Siem, F.M. (2000)	X			
Helmreich, R.L., Merritt, A.C., & Wilhelm, J.A. (1999)			X	
Helmreich, R.L., Wilhelm, J.A., Klinect, J.A., & Merritt, A.C. (2001)			X	
Hollenbeck, J.R., Ilgen, D.R., LePine, J.A., Colquitt, J.A., & Hedlund, J. (1998)		X		

16

Reference				
Jentsch, F., Barnett, J., Bowers, C.A., & Salas, E. (1999)			X	
Jordan, M.H., Field, H.S., & Armenakis, A.A. (2002)				X
Karrasch, A.I. (2003)	X			X
Kay, R.E. (1998)	X			
Keithly, D.M., & Tritten, J.J. (1997)		X		
Klimoski, R., & Mohammand, S. (1994)		X		
Knouse, S.B. (1998)		X		
Knouse, S.B. (2001)		X		
Leboeuf, J.N. (1997)		X	X	
Leedom, D.K. (1994)		X		
Leedom, D.K., & Simon R. (1995)	X	X		
Mael, F.A., & Alderks, C.E. (1993)				
Marks, M.A., Sabella, M.J., Burke, C.S., & Zaccaro, S.J. (2002)	X	X		
Masi, R.J., & Cooke, R.A. (2000)			X	
McCann, C., & Baranski, J.V. (2000)	X	X		
McCormack, L., & Mellor, D. (2002)		X		
Mearns, K., Flin, R., & O'Connor, P. (2001)	X	X		
Militello, L.G., Kyne, M.M., Klein, G., Getchell, K., & Thordsen, M. (1999)		X	X	
Mjos, K. (2001)			X	
Mumford, M.D., Marks, M.A., Connelly, M.S., Zaccaro, S.J., & Reiter-Palmon, R. (2000)	X			
Mumford, M.D., Zaccaro, S.J., Harding, F.D., Jacobs, T.O., & Fleishman, E.A. (2000)	X			
Mumford, M.D., Zaccaro, S.J., Johnson, J.F., Diana, M., Gilbert, J.A., & Threlfall, K.V. (2000).	X	X		
Naff, K.C., & Thompson, R.C. (2000)	X			
Neason, Jr., C. (1998)		X		
Niebuhr, R.E., Knouse, S.B., & Dansby, M.R. (1994)	X	X		
Nullmeyer, R.T., & Spiker, V.A. (2003)	X	X		
O'Connor, P., Hans-Jurgen, H., Flin, R., Lodge, M., & Goeters, K.M. (2002)		X		

Reference				
Oser, R.L., Salas, E., Merket, D.C., Walwanis, M.M., & Bergondy, M.L. (2000)			X	
Paris, C.R., Salas, E., & Cannon-Bowers, J.A. (2000)	X			X
Ployhart, R.E., Lim, B., & Chan, K. (2001)				X
Popper, M. (1996)		X		
Prinzo, O.V. (1996)		X		
Rasker, P.C., Post, W.M., & Schraagen, J.M.C. (2000)			X	
Rentsch, J.R., McNeese, M.D., Pape, L.J., Burnett, D.D., Darcy, M.M., & Anesgart, M.N. (1998).			X	
Rielly, R. (2001)			X	
Rosen, L.N., Knudson, K.H., & Fancher, P. (2003)			X	
Salas, E., Burke, C.S., & Cannon-Bowers, J.A. (2000)			X	
Salas, E., Burke, C.S., Bowers, C.A., & Wilson, K.A. (2001)			X	
Salas, E., Burke, C.S., & Samman, S.N. (2001)				
Salas, E., Fowlkes, J.E., Stout, R.J., Milanovich, D.M., & Prince, C. (1999)	X		X	
Shamir, B., Brainin, E., Zakay, E., & Popper, M. (2000)	X			X
Siebold, G.L. (1999)				X
Smith-Jentsch, K.A., Salas, E., & Brannick, M.T. (2001)				X
Spiszer, J.M. (1999)				X
Sumer, H.C., Sumer, N., Demirutku, K., & Cifci, O. S. (2001)		X		X
Thomas, J.L., Dickson, M.W., & Bliese, P.D. (2001)				
Wiegmann, D.A., von Thaden, T.L., Mitchell, A.A., Sharma, G., & Zhang, H. (2003)	X			
Winslow, D. (1999)	X	X		
Yagil, D. (1995)				X
Zaccaro, S.J., Gualtieri, J., & Minionis, D. (1995)				
Zaccaro, S.J., Rittman, A.L., & Marks, M.A. (2001)		X		
Zazanis, M.M., Zaccaro, S.J., & Kilcullen, R.N. (2001)				

References

Bailey, L.L. & Thompson, R.C. (2000). *The effects of performance feedback on air traffic control teams coordination: A simulation study.* (DOT/FAA/AM-00/25). Washington, D.C.: Department of Transportation Federal Aviation Administration.

Baker, D.P., & Salas, E. (1996). Analyzing team performance: In the eye of the beholder? *Military Psychology, 8(3),* 235-245.

Bartone, P.T., & Adler, A.B. (2000). Cohesion over time in a peacekeeping medical task force. *Military Psychology, 11(1),* 85-107.

Bartone, P.T., Bjorn, H.J., Eid, J., Brun, W., & Laberg, J.C. (2002). Factors influencing small-unit cohesion in Norwegian navy officer cadets. *Military Psychology, 14(1),* 1 – 22.

Bass, B.M, Avolio, B.J., Jung, D.I., & Berson, Y. (2003). Predicting unit performance by assessing transformational and transactional leadership. *Journal of Applied Psychology, 88(2),* 207-218.

Behling, O., & McFillen, J.M. (1996). A syncretical model of charismatic/transformational leadership. *Group & Organization Management, 21(2),* 163-181.

Bliese, P.D., & Castro, C.A. (1999). *Cumulative effects of organizational stressors: Evidence for the buffering hypothesis.* (USAMRMC Technical Report). Ft. Detrick, MD: U.S. Army Medical Research & Material Command. (ADA369023)

Bowers, C.A., Baker, D.P., & Salas, E. (1994). Measuring the importance of teamwork: The reliability and validity of job/task analysis indices for team-training design. *Military Psychology, 6(4),* 205-214.

Bowers, C.A., Morgan, B.B., Jr., Salas, E., & Prince, C. (1993). Assessment of coordination demand for aircrew coordination training. *Military Psychology, 5(2),* 95-112.

Brannick, M.T., Prince, C., & Salas, E. (2002). The reliability of instructor evaluations of crew performance: Good news and not so good news. *The International Journal of Aviation Psychology, 12(3),* 241-261.

Britt, T.W. (1996). *Responsibility, morale, and commitment during military operations.* (USAMRMC Research Report no. 24). Army Medical Research Unit Europe. (AD A313 143)

Brooks, C.M., & Ammons, J.L. (2003). Free riding in group projects and the effects of timing, frequency, and specificity of criteria in peer assessments. *Journal of Education for Business, 78(5),* 268-272.

Brown, N.M., & Moren, C.R. (2003). Background emotional dynamics of crew resource management: Shame emotions and coping responses. *International Journal of Aviation Psychology, 13(3),* 269-286.

Campbell, K.S., White, C.D., & Johnson, D.E. (2003). Leader-member relations as a function of rapport management. *The Journal of Business Communication, 40(3),* 170-194.

Cannon-Bowers, J.A., & Salas, E. (1998). Team performance and training in complex environments: Recent findings from applied research. *Current Directions in Psychological Science,* 83-87.

Cannon-Bowers, J.A., Salas, E., & Converse, S. (1993). Shared mental models in expert team decision making. In N. J. Castellan, Jr. (Ed.), *Current issues in individual and group decision making* (pp. 221-246). Hillsdale, NJ: Lawrence Erlbaum.

Cannon-Bowers, J.A., Tannenbaum, S.I., Salas, E., & Volpe, C.E. (1995). Defining team competencies and establishing team training requirements. In R. Guzzo & E. Salas (Eds.), *Team effectiveness and decision making in organizations* (pp. 533-580). San Francisco: Jossey-Bass.

Carron, A.V., Brawley, L.R., & Widmeyer, W.N. (1998). The measurement of cohesiveness in sport groups. In J. Duda (Ed.), *Advances in sport and exercise psychology measurement* (pp. 213-226). Morgantown, WV: FIT Technologies.

Carron, A.V., Colman, M.M., Wheeler, J., & Stevens, D. (2002). Cohesion and performance in sport: A meta-analysis. *Journal of Sport & Exercise Psychology, 24,* 168-188.

Deluga, R.J. (1995). The relation between trust in the supervisor and subordinate organizational citizenship behavior. *Military Psychology, 7(1),* 1-16.

Dickson, M.W., Smith, D.B., Grojean, M.W., & Ehrhart, M. (2001). An organizational climate regarding ethics: The outcome of leader values and the practices that reflect them. *Leadership Quarterly, 12(2),* 197-217.

Dion, K.L. (2000). Group cohesion: From 'field of forces' to multidimensional construct. *Group Dynamics, 4(1),* 7-26.

Dvir, T., Eden, D., Avolio, B.J., & Shamir, B. (2002). Impact of transformational leadership on follower development and performance: A field experiment. *Academy of Management Journal, 45(4),* 735-744.

Flin, R., & Martin, L. (2001). Behavioral markers for crew resource management: A review of current practice. *The International Journal of Aviation Psychology, 11(1),* 95-118.

Foti, R.J., Hauenstein, N.M.A., & Sgro, J.A. (1998). *Linking leadership emergence to leadership effectiveness and team performance in a military population.* (ARI Research Note 99-01). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (AD A354 192)

Gayman, A.J., Gentner, F.C., Canaras, S.A., & Crissey, M.J. (1996). *Implications of crew resource management (CRM) training for tank crews.* Orlando, FL: U.S. Army Simulation, Training, and Instrumentation Command.

George, J.M. (1995). Asymmetrical effects of rewards and punishments: the case of social loafing. *Journal of Occupational & Organizational Psychology, 68(4),* 327-338.

Ginnett, R.C. (1993). Groups and leadership. In E.L. Wiener, B.G. Kanki, and R.L. Helmreich (Eds.), *Cockpit resource management* (71-98). San Diego, CA: Academic Press.

Goodwin, V.L., Wofford, J.C., & Whittington, J.L. (2001). A theoretical and empirical extension to the transformational leadership construct. *Journal of Organizational Behavior, 22,* 759-774.

Grice, R.L., & Katz, L. (2001). Saving face in the cockpit. *MS&T, 2,* 32-33.

Griffith, J. (2002). Multilevel analysis of cohesion's relation to stress, well-being, identification, disintegration, and perceived combat readiness. *Military Psychology, 14(3),* 217-239.

Hedge, J.W., Bruskiewicz, K.T., Borman, W.C., Hanson, M.A., Logan, K.K., & Siem, F.M. (2000). Selecting pilots with crew resource management skills. *The International Journal of Aviation Psychology, 10(4),* 377 – 392.

Helmreich, R.L., Merritt, A.C., & Wilhelm, J.A. (1999). The evolution of crew resource management training in commercial aviation. *The International Journal of Aviation Psychology, 9(1),* 19-32.

Helmreich, R.L., Wilhelm, J.A., Klinect, J.A., & Merritt, A.C. (2001). Culture, error, and crew resource management. In R.L. Helmreich, J. A. Wilhelm, J.R. Klinect, & A.C. Merritt (Eds.), *Improving Teamwork in Organizations* (p. 305-331). Hillsdale, NJ: Erlbaum.

Hogg, M.A. (2001). A social identity theory of leadership. *Personality & Social Psychology Review, 5(3),* 184-200.

Hogg, M.A., & Abrams, D. (Eds.) (1993). *Group motivation: Social psychological motivations.* Hemel Hempstead, England: Harvester Wheatsheaf.

Hogg, M.A., & Terry, D.J. (2000). Social identity and self-categorization processes in organizational contexts. *Academy of Management Review, 25(1),* 121-140.

Hollenbeck, J.R., Ilgen, D.R., LePine, J.A., Colquitt, J.A., & Hedlund, J. (1998). Extending the multilevel theory of team decision making: Effects of feedback and experience in hierarchical teams. *Academy of Management Journal, 41(3),* 269-282.

Ingraham, L.H., & Manning, F.J. (1981). Cohesion: Who needs it, what is it and how do we get it to them? *Military Review, 61(6),* 2-12.

Jordan, M.H., Field, H.S., & Armenakis, A.A. (2002). The relationship of group process variables and team performance. *Small Group Research, 33(1),* 121-150.

Judge, T.A., & Bono, J.E. (2000). Five factor model of personality and transformational leadership. *Journal of Applied Psychology, 85,* 751-765.

Karau, S.J., & Williams, K.D. (1995). Social loafing: Research findings, implications, and future directions. *Current Directions in Psychological Science, 4(5),* 134-140.

Karrasch, A.I. (2003). *Lessons learned on collective efficacy in multinational teams.* (Technical Report 1137). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (AD A414 109)

Keithly, D.M., & Tritten, J.J. (1997). A charismatic dimension of military leadership. *Journal of Political and Military Sociology, 25,* 131-146.

Keyton, J. (1999). Analyzing interaction patterns of dysfunctional teams. *Small Group Research, 30(4),* 491-518.

Kleinman, D.L., & Serfaty, D. (1989). Team performance assessment in distributed decision making. In R. Gibson, J.P. Kincaid, and B. Goldiez (Eds.), *Proceedings of the interactive Networked Simulation for Training Conference.* Orlando, FL: Institute of Simulation and Training, pp. 291-27.

Klimoski, R., & Mohammand, S. (1994). Team mental models: Construct or metaphor? *Journal of Management, 20,* 403-437.

Knouse, S.B. (1998). *Keeping 'on task': An exploration of task cohesion in diverse military teams.* (DEOMI Research Series Pamphlet 98-1). Patrick Air Force Base, FL: Defense Equal Opportunity Management Institute. (AD A359 547).

Knouse, S.B. (2001). *Diversity and shared team mental models in the military.* (DOMI Research Series Pamphlet 01-03). Patrick Air Force Base, FL: Defense Equal Opportunity Management Institute. (AD A403 424)

Lawler, E.J. (2001). An affect theory of social exchange. *American Journal of Sociology, 107(2),* 321-352.

Lawler, E.J., Thye, S.R., & Yoon, J. (2000). Emotion and group cohesion in productive exchange. *American Journal of Sociology, 106(3),* 616-657.

Leedom, D.K., & Simon, R. (1995). Improving team coordination: A case for behavior-based training. *Military Psychology, 7(2),* 109-122.

Lembke, S., & Wilson, M.G. (1998). Putting the team into teamwork: Alternative theoretical contributions for contemporary management practice. *Human Relations, 51(7),* 927-944.

Marks, M.A., & Panzer, F.J. (2004). The influence of team monitoring on team processes and performance. *Human Performance, 17(1),* 25-41.

Marlowe, D.H. (Ed.). (1985). *New Manning System field evaluation* (WRAIR Technical Report No. 1). Washington, D.C.: Walter Reed Army Institute of Research, Department of Military Psychiatry.

Masi, R.J. (2000). Effects of transformational leadership on subordinate motivation, empowering norms, and organizational productivity. *The International Journal of Organizational Analysis, 8(1),* 16-47.

McCann, C., & Baranski, J.V. (2000). On the utility of experiential cross-training for team decision-making under time stress. *Ergonomics, 43(8),* 1095-1110.

McIntyre, R.M., & Salas, E. (1995). Measuring and managing for team performance: Lessons from complex environments. In R.A. Guzzo, E. Salas, & Associates (Eds.), *Team effectiveness and decision making in organizations* (p. 9-45). San Francisco: Jossey-Bass.

Mearns, K., Flin, R., & O'Connor, P. (2001). Sharing 'worlds of risk': Improving communication with crew resource management. *Journal of Risk Research, 4(4),* 377-392.

Merritt, A. (1995). Facing the issue. *The CRM Advocate, 95(4),* 1-7.

Militello, L.G., Kyne, M.M., Klein, G., Getchell, K., & Thordsen, M. (1999). A syncretical model of team performance. *International Journal of Cognitive Ergonomics, 3(2),* 131-158.

Mumford, M.D., Zaccaro, S.J., Harding, F.D., Jacobs, T.O., & Fleishman, E.A. (2000). Leadership skills for a changing world: Solving complex social problems. *Leadership Quarterly, 11(1),* 25-34.

Murphy, S.M., Wayne, S.J., Liden, R.C., & Erdogan, B. (2003). Understanding social loafing: The role of justice perceptions and exchange relationships. *Human Relations, 56(1),* 61-84.

Niebuhr, R.E., Knouse, S.B., & Dansby, M.R. (1994). *Workgroup climates for acceptance of diversity: Relationship to group cohesiveness and performance.* (DEOMI Research Series Pamphlet 94-4). Patrick Air Force Base, FL: Defense Equal Opportunity Management Institute. (AD A293 823)

Nullmeyer, R.T., & Spiker, V.A. (2003). The importance of crew resource management behaviors in mission performance: Implications for training evaluation. *Military Psychology, 15(1),* 77-96.

Oliver, L.W., Harman, J., Hoover, E., Hayes, S.M., & Pandhi, N.A. (1999). A quantitative integration of the military cohesion literature. *Military Psychology, 11(1),* 57-83.

Paris, C.A., Salas, E., & Cannon-Bowers, J.A. (2000). Teamwork in multi-person systems: A review and analysis. *Ergonomics, 43(8),* 1052-1075.

Peusch, I., & Hicks, J. (2001). Army safety investment strategy team (ASIST): Translating aviation accident information to hazards and controls. *Proceedings of the 19th International System Safety Conference, USA, 2001. Systems Safety Society.*

Ployhart, R.E., Lim, B.C., & Chan, K.Y. (2001). Exploring relations between typical and maximum performance ratings and the five factor model of personality. *Personnel Psychology, 54,* 809-843.

Popper, M. (1996). Leadership in military combat units and business organizations: A comparative psychological analysis. *Journal of Managerial Psychology, 11(1),* 15-23.

Prince, C., & Salas, E. (1993). Training and research in the military aircrew. In E. Wiener, B. Kanki, & R. Helmreich (Eds.), *Cockpit resource management* (pp. 337-366). San Diego, CA: Academic.

Rasker, P.C., Post, W.M., & Schraagen, J.M.C. (2000). Effects of two types of intra-team feedback on developing a shared mental model in Command & Control teams. *Ergonomics, 43(8),* 1167-1189.

Rempel, M.W., & Fisher, R.J. (1997). Perceived threat, cohesion, and group problem solving in intergroup conflict. *International Journal of conflict Management, 8(3),* 216-234.

Rozell, E.J., & Gundersen, D.E. (2003). The effects of leader impression management on group perceptions of cohesion, consensus, and communication. *Small Group Research, 34(2),* 197-222.

Ruvolo, C.M., Petersen, S.A., & LeBoeuf, J.N.G. (2004). Leaders are made, not born: The critical role of a developmental framework to facilitate and organizational culture of development. *Consulting Psychology Journal: Practice and Research, 56(1),* 10-19.

Salas, E., Burke, C.S., Bowers, C.A., & Wilson, K.A. (2001a). Team training in the skies: Does crew resource management (CRM) training work? *Human Factors, 43(4),* 641-674.

Salas, E., Burke, C.S., & Cannon-Bowers, J.A. (2000). Teamwork: Emerging principles. *International Journal of Management Reviews, 2(4),* 339-356.

Salas, E., Burke, C.S., & Samman, S.N. (2001b). Understanding command and control teams operating in complex environments. *Information, Knowledge, Systems Management, 2,* 311-323.

Salas, E., Fowlkes, J.E., Stout, R.J., Milanovich, D.M., & Prince, C. (1999). Does CRM training improve teamwork skills in the cockpit? Two evaluation studies. *Human Factors, 41(2),* 326-343.

Shamir, B., & Ben-Ari, E. (1999). Leadership in an open Army? In J.G. Hunt, G.E. Dodge, and L. Wong (Eds.), *Out-of-the-box leadership: Transforming the twenty-first-century Army and other top-performing organizations* (pp. 15-40). Stamford, CT: JAI Press.

Shamir, B., Brainin, E., Zakay, E., & Popper, M. (2000). Perceived combat readiness as collective efficacy: Individual – and group – level analysis. *Military Psychology, 12(2),* 105-119.

Shepperd, J.A., & Taylor, K.M. (1999). Social loafing and expectancy-value theory. *Personality and Social Psychology Bulletin, 25(9),* 1147-1158.

Siebold, G.L. (1987, August). *Conceptualization and definitions of military unit cohesiveness.* Paper presented at the 95th Annual Convention of the American Psychological Association, New York.

Siebold, G.L. (1993, August). *The case of unit cohesion.* Paper presented at the 101st Annual Convention of the American Psychological Association, Toronto, Canada.

Siebold, G.L. (1999). The evolution of the measurement of cohesion. *Military Psychology, 11(1),* 5-26.

Tata, J. (2002). The influence of accounts on perceived social loafing in work teams. *The International Journal of Conflict Management. 13(3),* 292-308.

Thomas, K., & Jansen, E. (1996). *Intrinsic motivation in the military: Models and strategic importance.* (NPS-SM-96-001 Technical Report). Monterey, CA: Naval Postgraduate School.

van Knippenberg, D., & van Schie, E.C.M. (2000). Foci and correlates of organizational identification. *Journal of Occupational & Organizational Psychology, 73(2)*, 137-147.

van Vugt, M., & Hart, C.M. (2004). Social identity as social glue: The origins of group loyalty. *Journal of Personality and Social Psychology, 86(4)*, 585-598.

Wiegmann, D.A., von Thaden, T.L., Mitchell, A.A., Sharma, G., & Zhang, H. (2003). *Development and initial validation of a safety culture survey for commercial aviation.* (FAA Technical Report AHFD-03-3/FAA-03-1). Atlantic City International Airport, NJ: Federal Aviation Administration.

Zaccaro, S.J., Gualtieri, J., & Minionis, D. (1995). Task cohesion as a facilitator of team decision making under temporal urgency. *Military Psychology, 7(2)*, 77-93.

Zaccaro, S.J., Rittman, A.L., & Marks, M.A. (2001). Team leadership. *The Leadership Quarterly, 12*, 451-483

Appendix A

Annotated Bibliography

Article Reviewed	Page
Bailey, L.L., & Thompson, R.C. (2000). *The effects of performance feedback on air traffic control team coordination: A simulation study.* (DOT/FAA/AM-00/25). Washington, D.C.: Department of Transportation Federal Aviation Administration.	6
Baker, D.P., & Salas, E. (1996). Analyzing team performance: In the eye of the beholder? *Military Psychology, 8(3),* 235-245.	7
Bartone, P.T., & Adler, A.B. (2000). Cohesion over time in a peacekeeping medical task force. *Military Psychology, 11(1),* 85-107.	8
Bartone, P.T., Bjorn, H.J., Eid, J., Brun, W., & Laberg, J.C. (2002). Factors influencing small-unit cohesion in Norwegian navy officer cadets. *Military Psychology, 14(1),* 1 – 22.	8
Bass, B.M., Avolio, B.J., Jung, D.I., & Berson, Y. (2003). Predicting unit performance by assessing transformational and transactional leadership. *Journal of Applied Psychology, 88(2),* 207-218.	9
Beard, R.L., Salas, E., & Prince, C. (1995). Enhancing transfer of training: Using role-play to foster teamwork in the cockpit. *International Journal of Aviation Psychology, 5(2),* 131-143.	10
Behling, O., & McFillen, J.M. (1996). A syncretical model of charismatic/transformational leadership. *Group & Organization Management, 21(2),* 163-181.	10
Bliese, P.D., & Castro, C.A. (1999). *Cumulative effects of organizational stressors: Evidence for the buffering hypothesis.* (WRAIR Report). Washington, D.C.: Walter Reed Army Institute of Research. (AD A369023)	11
Bowers C.A., Baker, D.P., & Salas, E. (1994). Measuring the implications of teamwork: The reliability and validity of job/task analysis indices for team-training design. *Military Psychology, 6(4),* 205-214.	11
Brannick, M.T., Prince, C., & Salas, E. (2002). The reliability of instructor evaluations of crew performance: Good news and not so good news. *The International Journal of Aviation Psychology, 12(3),* 241-261.	12
Britt, T.W. (1996). *Responsibility, morale, and commitment during military operations.* (USAMRMC Research Report no. 24). APO AE: U.S. Army Medical Research Unit-Europe. (AD A313 143).	13
Cannon-Bowers, J.A., & Salas, E. (1998). Team performance and training in complex environments: Resent findings from applied research. *Current Directions in Psychological Science,* 83-87.	13
Davis, W., & Fedor, D.B. (1998). *The role of self-esteem and self-efficacy in detecting responses to feedback.* (ARI Research Note 98-23). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (AD A349 452)	14
Deluga, R.J. (1995). The relation between trust in the supervisor and subordinate organizational citizenship behavior. *Military Psychology, 7(1),* 1-16.	14

Dvir, T., Eden, D., Avolio, B.J., & Shamir, B. (2002). Impact of transformational leadership on follower development and performance: A field experiment. *Academy of Management Journal, 45(4)*, 735-744.	15
Flin, R., & Martin, L. (2001). Behavioral markers for crew resource management: A review of current practice. *The International Journal of Aviation Psychology, 11(1)*, 95-118.	15
Foti, R.J., Hauenstein, N.M.A., & Sgro, J.A. (1998). *Linking leadership emergence to leadership effectiveness and team performance in a military population.* (ARI Research Note 99-01). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (AD A354 192)	16
Griffith, J. (2002). Multilevel analysis of cohesion's relation to stress, well-being, identification, disintegration, and perceived combat readiness. *Military Psychology, 14(3)*, 217-239.	16
Harriel, D.W. (1997). *The certificate of commission: A commitment to leadership.* (Research Report). Maxwell AFB, AL: Air Command and Staff College. (AD A392 961)	17
Hedge, J.W., Bruskiewicz, K.T., Borman, W.C., Hanson, M.A., Logan, K.K., & Siem, F.M. (2000). Selecting pilots with crew resource management skills. *The International Journal of Aviation Psychology, 10(4)*, 377 – 392.	17
Helmreich, R.L., Merritt, A.C., & Wilhelm, J.A. (1999). The evolution of crew resource management in commercial aviation. *The International Journal of Aviation Psychology, 9(1)*, 19-32.	18
Helmreich, R.L., Wilhelm, J.A., Klinect, J.A., & Merritt, A.C. (2001). Culture, error, and crew resource management. In R.L. Helmreich, J. A. Wilhelm, J.R. Klinect, & A.C. Merritt (Eds.), *Improving Teamwork in Organizations* (p. 305-331). Hillsdale, NJ: Erlbaum.	19
Hollenbeck, J.R., Ilgen, D.R., LePine, J.A., Colquitt, J.A., & Hedlund, J. (1998). Extending the multilevel theory of team decision making: Effects of feedback and experience in hierarchical teams. *Academy of Management Journal, 41(3)*, 269-282.	20
Jentsch, F., Barnett, J., Bowers, C.A., & Salas, E. (1999). Who is flying this plane anyway? What mishaps tell us about crewmember role assignment and aircrew situation awareness. *Human Factors, 4(1)*, 1-14.	20
Jordan, M.H., Field, H.S., & Armenakis, A.A. (2002). The relationship of group process variables and team performance. *Small Group Research, 33(1)*, 121-150.	21
Karrasch, A.I. (2003). *Lessons learned on collective efficacy in multinational teams.* (ARI Technical Report 1137). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (AD A414 109)	21
Kay, R.E. (1998). *Strategic leadership: It doesn't take a bully* [Abstract]. (USAWC Strategic Research Project). Carlisle Barracks, PA: Army War College. (AD A345 516)	22
Keithly, D.M., & Tritten, J.J. (1997). A charismatic dimension of military leadership. *Journal of Political and Military Sociology, 23*, 131-146.	22
Klimoski, R., & Mohammed, S. (1994). Team mental models: Construct or metaphor? *Journal of Management, 20(2)*, 403-437.	23

Knouse, S.B. (1998). *Keeping 'on task': An exploration of task cohesion in diverse military teams.* (DEOMI Report). Patrick Air Force Base, FL: Defense Equal Opportunity Management Institute.	23
Knouse, S.B. (2001). *Diversity and shared mental team mental models in the military.* (DEOMI Research Report). Patrick Air Force Base, FL: Defense Equal Opportunity Management Institute. (AD A403 424)	23
Leboeuf, J.N. (1997). *Feedback: A critical leadership resource.* (USAWC Research Report). Carlisle Barracks, PA: U.S. Army War College. (AD A326 794)	23
Leedom, D.K. (1994). What is this thing called "crew coordination"? *U.S. Army Aviation Digest, May/June.*	24
Leedom, D.K., & Simon R. (1995). Improving team coordination: A case for behavior-based training. *Military Psychology, 7(2),* 109-122.	24
Mael, F.A., & Alderks, C.E. (1993). Leadership team cohesion and subordinate work unit morale and performance. *Military Psychology, 5(3),* 141-158.	25
Marks, M.A., Sabella, M.J., Burke, C.S., & Zaccaro, S.J. (2002). The impact of cross-training on team effectiveness. *Journal of Applied Psychology, 87(1),* 3-13.	25
Masi, R.J., & Cooke, R.A. (2000). Effects of transformational leadership on subordinate motivation, empowering norms, and organizational productivity. *The International Journal of Organizational Analysis, 8(1),* 16-47.	25
McCann, C., & Baranski, J.V. (2000). On the utility of experiential cross-training for team decision-making under time stress. *Ergonomics, 43(8),* 1095-1110.	26
McCormack, L., & Mellor, D. (2002). The role of personality in leadership: An application of the five-factor model in the Australian military. *Military Psychology, 14(3),* 179-197.	26
Mearns, K., Flin, R., & O'Conner, P. (2001). Sharing 'worlds of risks': Improving communication with crew resources management. *Journal of Risk Research, 4(4),* 377-392.	27
Militello, L.G., Kyne, M.M., Klein, G., Getchell, K., & Thordsen, M. (1999). A synthesized model of team performance. *International Journal of Cognitive Ergonomics, 3(2),* 131-158.	28
Mjos, K. (2001). Communication and operational failures in the cockpit. *Human Factors & Aerospace Safety, 1(4),* 323-340.	28
Mumford, M.D., Marks, M.A., Connelly, M.S., Zaccaro, S.J., & Reiter-Palmon, R. (2000). Development of leadership skills: Expertise and timing. *Leadership Quarterly, 11(1),* 87-114.	28
Mumford, M.D., Zaccaro, S.J., Harding, F.D., Jacobs, T.O., & Fleishman, E.A. (2000). Leadership skills for a changing world: Solving complex social problems. *Leadership Quarterly, 11(1),* 25-35.	29
Mumford, M.D., Zaccaro, S.J., Johnson, J.F., Diana, M., Gilbert, J.A., & Threlfall, K.V. (2000). Patterns of leader characteristics: Implications for performance and development. *Leadership Quarterly, 11(1),* 115-133.	29
Naff, K.C., & Thompson, R.C. (2000). *The impact of teams on the climate for diversity in government: The FAA experience.* (DOT/FAA/AM-00/27). Washington, DC: Federal Aviation Administration.	30

Neason, Jr., C. (1998). *Operational leadership: What is it?* (USACGSC Monograph). Fort Leavenworth, KS: U.S. Army Command and General Staff College. (AD A357 894)	30
Niebuhr, R.E., Knouse, S.B., & Dansby, M.R. (1994). *Workgroup climates for acceptance of diversity: Relationship to group cohesiveness and performance.* (DEOMI Research Series Pamphlet 94-4). Patrick Air Force Base, FL: Defense Equal Opportunity Management Institute. (AD A293 823)	31
Nullmeyer, R.T., & Spiker, V.A. (2003). The importance of crew resource management behaviors in mission performance: Implications for training evaluation. *Military Psychology, 15(1),* 77-96.	31
O'Connor, P., Hans-Jurgen, H., Flin, R., Lodge, M., & Goeters, K.M. (2002). Developing a method for evaluating crew resource management skills: A European perspective. *The International Journal of Aviation Psychology, 12(3),* 263-285.	31
Oser, R.L., Salas, E., Merket, D.C., Walwanis, M.M., & Bergondy, M.L. (2000). Can applied research help naval aviation?: Lessons learned implementing crew resource management training in the Navy. *Transportation Human Factors, 2(4),* 331-345.	32
Paris, C.R., Salas, E., & Cannon-Bowers, J.A. (2000). Teamwork in multi-person systems: A review and analysis. *Ergonomics, 43(8),* 1052-1075.	33
Ployhart, R.E., Lim, B., & Chan, K. (2001). Exploring relations between typical and maximum performance ratings and the five factor model of personality. *Personnel Psychology, 54, 809-843.*	33
Popper, M. (1996). Leadership in military combat units and business organizations: A comparative psychological analysis. *Journal of Managerial Psychology, 11(1),* 15-23.	34
Prinzo, O.V. (1996). *An analysis of approach control/pilot voice communications.* (Final Report). Washington, DC: Federal Aviation Administration. (AD A317 528)	35
Rasker, P.C., Post, W.M., & Schraagen, J.M.C. (2000). Effects of two types of intra-team feedback on developing a shared mental model in Command & Control teams. *Ergonomics, 43(8),* 1167-1189.	35
Rentsch, J.R., McNeese, M.D., Pape, L.J., Burnett, D.D., Darcy, M.M., & Anesgart, M.N. (1998). *Testing the effects of team processes on team member schema similarity and team performance: Examination of the team member schema similarity model.* (AFRL-HE-WP-TR-1998-0070). Dayton, OH: Wright State University. (AD A355 525)	36
Rielly, R. (2001). The darker side of the force. *Military Review,* March-April, 58-64.	36
Rosen, L.N., Knudson, K.H., & Fancher, P. (2003). Cohesion and the culture of hypermasculinity in U.S. Army units. *Armed Forces & Society, 29(3),* 325-351.	37
Salas, E., Burke, C.S., & Cannon-Bowers, J.A. (2000). Teamwork: Emerging principles. *International Journal of Management Reviews, 2(4),* 339-357.	37
Salas, E., Burke, C.S., Bowers, C.A., & Wilson, K.A. (2001). Team training in the skies: Does crew resource management (CRM) training work? *Human Factors, 43(4),* 641-674.	38
Salas, E., Burke, C.S., & Samman, S.N. (2001). Understanding command and control teams operating in complex environments. *Information Knowledge Systems Management (2),* 311-323.	39

Salas, E., Fowlkes, J.E., Stout, R.J., Milanovich, D.M., & Prince, C. (1999). Does CRM training improve teamwork skills in the cockpit? Two evaluation studies. *Human Factors, 41(2)*, 326–343.	39
Shamir, B., Brainin, E., Zakay, E., & Popper, M. (2000). Perceived combat readiness as collective efficacy: Individual- and group-level analysis. *Military Psychology, 12(2)*, 15-20.	40
Siebold, G.L. (1999). The evolution of the measurement of cohesion. *Military Psychology, 11(1)*, 5-26.	41
Smith-Jentsch, K.A., Salas, E., & Brannick, M.T. (2001). To transfer or not to transfer? Investigating the combined effects of trainee characteristics, team leader support, and team climate. *Journal of Applied Psychology, 86(2)*, 279-292.	43
Spiszer, J.M. (1999). Leadership and combat motivation: The critical task. *Military Review, 79(3)*, 66-70.	43
Sumer, H.C., Sumer, N., Demirutku, K., & Cifci, O. S. (2001). Using a personality-oriented job analysis to identify attributes to be assessed in officer selection. *Military Psychology,13(3), 129-146.*	44
Thomas, J.L., Dickson, M.W., & Bliese, P.D. (2001). Values predicting leader performance in the U.S. Army Reserve Officer Training Corps Assessment Center: Evidence for a personality-mediated model. *The Leadership Quarterly, 12*, 181-196.	44
Wiegmann, D.A., von Thaden, T.L., Mitchell, A.A., Sharma, G., & Zhang, H. (2003). *Development and initial validation of a safety culture survey for commercial aviation.* (FAA Technical Report AHFD-03-3/FAA-03-1). Washington, DC: Federal Aviation Administration.	45
Winslow, D. (1999). Rites of passage and group bonding in the Canadian Airborne. *Armed Forces & Society: An Interdisciplinary Journal, 25(3)*, 429–457.	45
Yagil, D. (1995). *A study of cohesion and other factors of major influence on Soldiers' and unit effectiveness.* (ARI Research Note 95-11). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (AD A299 079)	46
Zaccaro, S.J., Gualtieri, J., & Minionis, D. (1995). Task cohesion as a facilitator of team decision making under temporal urgency. *Military Psychology, 7(2)*, 77-93.	47
Zaccaro, S.J., Rittman, A.L., & Marks, M.A. (2001). Team leadership. *The Leadership Quarterly, 12*, 451-483.	48
Zazanis, M.M., Zaccaro, S.J., & Kilcullen, R.N. (2001). Identifying motivation and interpersonal performance using peer evaluations. *Military Psychology, 13(2)*, 73-88.	48

Annotations

1. **Bailey, L.L., & Thompson, R.C. (2000).** *The effects of performance feedback on air traffic control team coordination: A simulation study.* (DOT/FAA/AM-00/25). **Washington, D.C.: Department of Transportation Federal Aviation Administration.**

The definition of *aircrew* has evolved in Crew Resource Management (CRM) from focusing on the cockpit crew exclusively to incorporating flight support. Air traffic control (ATC) is an essential member of the aircrew and there is a growing interest in providing CRM skills training for ATC personnel. This study examined the potential efficacy of providing CRM training for ATC personnel. Bailey and Thompson sought to determine if CRM training improved cooperation between ATC personnel. Specifically, they studied the affect of CRM training upon team cohesion, shared mental models, the percentage of aircraft that successfully reached their destination, and subjective workload.

Four-person teams were created from 240 individuals acquired through a temporary help provider and who passed a 10-minuted test of simulated ATC tasks. Thirty minutes of training were provided to each individual prior to testing. Each subject was tested on the training and given three opportunities to receive a passing score before assignment to a group. Each team was assigned to one of six experimental conditions based upon the type of training received and the level of aircraft density used in the experiment. Teams were given two hours of training and one hour of experiments. During the two hours of training each team was assigned one of two training conditions with one stressing the development of individual sector management strategies and the other stressing team management strategies.

Feedback was provided to both training groups in the form of computer replay. Individual-oriented subjects received feedback concerning their performance on a previous exercise and were asked to suggest ways their performance might be improved. No interaction was allowed with other team members. The team-oriented subjects were given a performance replay as a team and were asked to suggest ways as a team that their performance might increase. Self-report measures were used to gather data on cohesion and perceived performance.

Findings indicated that the level of aircraft density and the type of training received influenced perceptions of cohesion and shared mental models. Cohesion was higher among team-oriented groups in the low-density conditions than for groups receiving individual-oriented feedback. There was no significant difference under medium or high aircraft density conditions. Shared mental models were evident under high-density conditions regardless of the training modality.

The authors concluded that providing visual, performance feedback, can augment CRM training. Granted, this study found the effects of performance feedback to be most significant in low-stress conditions. The authors suggested that further research is warranted concerning the value of incorporating visual performance feedback in training and in determining new ways to create team-oriented training as a method of improving safety and mission success.

2. Baker, D.P., & Salas, E. (1996). Analyzing team performance: In the eye of the beholder? *Military Psychology, 8(3),* 235-245.

Can team members perceive teamwork behaviors differently based upon their level of experience? Baker and Salas suggested that member experiences can influence the behaviors they believe are crucial for teamwork. If this premise is accurate, it raises the possibility that some behaviors deemed necessary by the military (e.g., communication, cooperation, feedback) for crew safety and mission success, might be overlooked by some members of military aircrews.

Teamwork was distinguished by the authors as consisting of taskwork and teamwork. Taskwork was composed of member behaviors that are necessary for the individual to execute the functions expected of that member. Teamwork focused on those individual behaviors that promote cooperation and interaction between members as they function towards accomplishing team goals. These two concepts served as the two items of measurement for this study.

Military pilots from three aviation communities (i.e., training, fixed-wing, and cargo helicopter) were incorporated into this study. The study consisted of 38 training pilots, 20 fixed-wing pilots, and 46 cargo helicopter pilots. The group was equally divided between instructor pilots and student pilots. All were given questionnaires to complete that included behaviors associated with achieving effective teamwork in the cockpit.

Five dimensions were adopted to assist in measuring task and team performance. These five dimensions included: a) criticality of error; b) difficulty; c) time spent; d) difficulty of learning; and e) importance for training. Criticality of error was associated with performing the behavior correctly. Difficulty is the difficulty of performing the behavior. Time spent is the amount of time needed to perform the behavior. Difficulty of learning is the complexity of learning to perform the behavior correctly. Importance of training is the degree to which the behavior should be addressed through training or relevance.

Differences were demonstrated between high-experience and low-experience members in all three teams. Low-experience members from the training teams were found to place more emphasis on the criticality of error, difficulty, importance to train, and difficulty in learn a team behavior. For the cargo helicopter teams, low-experience members cited greater emphasis on difficulty of performing a team behavior while high-experience members placed a greater emphasis on the time spent performing a team behavior. The differences among the fixed-wing teams were small but not significant and the authors cite the small sample size as a possible cause.

In general, the task of learning to perform a team behavior appeared to cause the most stress for inexperienced aviators. The stress diminished over time as the member gained experience and new skills are learned. The authors noted that their findings support the contention of some that teams mature over time. Therefore, they concluded that training programs should consider a developmental approach of focusing on skills and behaviors necessary at various levels of the aviator's maturity.

3. **Bartone, P.T., & Adler, A.B. (2000). Cohesion over time in a peacekeeping medical task force.** *Military Psychology, 11(1),* **85-107.**

Cohesion is often examined in terms of combat units. Deployments can potentially stress the relationship between commitment and cohesion depending upon relational and situational dynamics at home and team dynamics related to interaction and performance in the field. This study examines how cohesion develops within a combat support medical unit. Bartone and Adler acknowledged the likelihood that cohesion influences Soldier morale, stress resiliency, and performance.

This study surveyed medical personnel preparing for deployment to Yugoslavia. The number of Soldiers to be deployed was 236 with 186 medical personnel and 50 assigned to other specialties. Information was gathered during pre-deployment, mid-deployment, and late-deployment. Findings indicated that cohesion developed in an inverted-U pattern and was influenced by relational factors. In other words, cohesion began low and then increased by mid-deployment. However, it decreased again by the end of the 6-month deployment. Additionally, relational factors seemed to negatively relate with cohesion development. Relational problems during pre-deployment and co-worker problems during deployment correlate negatively with cohesion.

Levels of cohesion were reported at different levels based upon occupation and level of activity. Cohesion was found to be strongest among physicians and military police. The lowest level of cohesion was reported among operating room staff. Boredom was identified as a negatively correlating with cohesion. Factors emerged that served to maintain cohesion in different levels of deployment. First, confidence in leadership is imperative in early-deployment. Second, confidence in fellow Soldiers and mission success was important in mid-deployment. Confidence in leaders emerged once again as important in late-deployment coupled with the confidence that matters are being cared for on the home front.

4. **Bartone, P.T., Bjorn, H.J., Eid, J., Brun, W., & Laberg, J.C. (2002). Factors influencing small-unit cohesion in Norwegian navy officer cadets.** *Military Psychology, 14(1),* **1 – 22.**

The authors posit that cohesion is a significant positive influence upon performance. This study sought to determine what role unit activity, prior familiarity, and personality play in producing cohesion. Leadership styles are given particular attention since the researchers assume that leaders bear the responsibility for creating a team atmosphere where cohesion can be encouraged.

The researchers suggested that unit cohesion begins with an identification process between the individual and the team. However, military cohesion often requires additional explanation given the unique environment and circumstances under which military units function. The researchers cited the role of leadership and confidence in leadership as an indication of later cohesion development. Leaders conveying confidence, competence, and concern for their subordinates are generally perceived as more effective. One reason might be that such leaders

have the ability to inspire high degrees of sense-making related to military training or procedures.

The primary personality factor incorporated in this study was hardiness. Hardiness is a personality or cognitive style marked by increased levels of commitment, control, and challenge. Specifically, the characteristic of hardiness considered in this study focused on the ability of a group to frame stressful unit conditions in a positive way. Research generally suggests that combining group hardiness with positive leadership increases cohesion.

This study involved two cohorts of Norwegian Navy officer candidates (n = 162) during a week-long intensive field training exercise designed to increase their leadership skills. The study included one cohort assembled just prior to training and another cohort in its second year of training that together the previous year. One phase of this training included the candidates experiencing treatment as prisoners of war (POWs). Cohesion was defined as the basic one-dimensional bond or commitment of members to the group. The researchers sought to determine if familiarity, shared experience of a stressful event, perceived qualities of leaders, and group level hardiness would prove to be significant factors on cohesion.

Findings supported that familiarity alone does increase cohesion but not to a significant level. Instead, cohesion appears to develop from a combination of familiarity and the group experiencing a stressful task or exercise. Leadership behavior was found to be an important factor in terms of the perceptions subordinates create of what the leader does and how he does it. Personality hardiness was also found to increase cohesion among teams in the post-exercise phase.

5. **Bass, B.M., Avolio, B.J., Jung, D.I., & Berson, Y. (2003). Predicting unit performance by assessing transformational and transactional leadership.** *Journal of Applied Psychology, 88(2),* **207-218.**

Leadership research has sought to distinguish two styles that are commonly found in the military. Transactional leadership is characterized by issuing edicts or orders. Compliance leads to rewards and non-compliance results in punishment. Transformational leadership builds upon leader credibility, adapts to changing conditions, and seeks to motivate by inspiring members to contribute to the teamwork effort.

A total of 72 platoons made of three rifle squads and a heavy weapons squad participated in joint training exercises. Each platoon was led by a platoon sergeant and a commissioned second lieutenant. A group potency and cohesiveness survey was administered 4 to 6 weeks before each platoon attended training. Trained observers scored the platoons at the completion of three separate phases during their two weeks of training.

Findings indicated that transactional leadership is more predictive of team performance. The authors suggested that transactional leadership was better suited for military units given the high-stress environment where they function, the need to discharge directives, and the brief training they often receive. Another possibility is that high attrition requires that only transactional leadership be present since the leader-led relationship will be temporal. Bass et al.

recognized that transformational leadership appeared more prevalent at higher levels of leadership such as at the platoon level. Platoon sergeants have daily contact with the troops and have worked their way through the ranks so familiarity can form a bond with young Soldiers that officers may not experience. Little empirical support was found for this hypothesis in this study, but they suggest this effect might be better measured in future research.

6. **Beard, R.L., Salas, E., & Prince, C. (1995). Enhancing transfer of training: Using role-play to foster teamwork in the cockpit.** *International Journal of Aviation Psychology, 5(2)*, 131-143.

Teamwork training has developed as an effective way to improve performance. The challenge is to determine ways to transfer the skills from a classroom context to the cockpit. One approach is to use role-playing as a training medium to transfer skills. Role-plays allow teams to practice teamwork skills and receive feedback on their performance. Role-plays provide a cost-effective way to practice targeted behaviors, but the limitations of this approach were discussed.

7. **Behling, O., & McFillen, J.M. (1996). A syncretical model of charismatic/transformational leadership.** *Group & Organization Management, 21(2)*, 163-181.

Leadership studies have sought to determine why and how certain leaders or managers are able to motivate high levels of commitment, effort, and a willingness to take risks for the sake of the team or the organization's mission. Behling and McFillen concluded the transformational/charismatic leadership is the key. The benefits of such leadership are obvious and especially as teams experience unexpected changes. The authors offered that despite the benefits of creating transformational leadership much of our understanding of this style is anecdotal.

Behling and McFillen proposed behaviors that seem prerequisite to transformational leadership. They identify six leader behaviors commonly identified in research as characterizing transformational leaders. These behaviors include; a) displays empathy, b) dramatizes the mission, c) projects self-assurance, d) enhances the leader's image, e) assures followers of their competency, and f) provides followers with opportunities to experience success. These behaviors are believed to strengthen follower inspiration, awe, and empowerment.

Inspiration involves the leader conveying a vision for the team that exceeds simple pragmatic goals and offers a transcendent moral quality or ethical responsibility. Part of inspiration is the consistent commitment of the leader to team goals. A second component of inspiration is leader behavior that demonstrates empathy and dramatizes the mission. Dramatizing the mission occurs as the leader learns to tap the emotions of the follower to elicit an emotional commitment to the team.

Awe is the high degree of faith in the abilities of the leader and a strong affection for the leader. Such leaders often are the recipients of much acceptance, follower compliance, and deference from followers. Leader awe can extend to lifestyle choices outside of the team and leader directives can extend beyond the work environment. Leaders nurture awe in followers by

projecting self-assurance and by engaging in behaviors that enhance leader image. The key behaviors that encourage awe are a selfless commitment to the team and team goals, demonstrating competence, and a nurturing attitude.

Empowerment is the ability to inspire self-confidence or self-efficacy within the follower. Studies suggest that a sense of empowerment occurs as leaders expect high performance and convey their sense of confidence in the team's ability to perform at a high level. Leaders inspire empowerment by assuring followers of their competency and by providing opportunities to experience success.

Behling and McFillen suggested their findings merit further research. Though the behaviors they cited are the result of research, the continued relevance of these behaviors needs to be studied. Lastly, the authors suggested the need to research the portability of transformational leadership training between different organizational and ethnic cultures.

8. **Bliese, P.D., & Castro, C.A. (1999).** *Cumulative effects of organizational stressors: Evidence for the buffering hypothesis.* **(WRAIR Report). Washington, D.C.: Walter Reed Army Institute of Research. (AD A369023)**

Military and aviation teams will experience stressors from time-to-time. Bliese and Castro examined the possibility that leader responses to team stressors might influence the cumulative effects of stressors upon followers. Specifically, they sought to determine if leader response might potentially serve as a buffer for followers. Information was collected from 2,273 U.S. Army Soldiers attending a summer training exercise. They identified groups based upon social support or non-support from leaders and peers. Two factors, role overload and role clarity/ambiguity, were measured. High role overload or role ambiguity was hypothesized to result in high levels of distress.

Leadership support emerged as a significant factor. Low leader social support teams reported high levels of role overload or ambiguity and high levels of distress. When social support was high from leaders high distress was not reported unless both role overload and role ambiguity were present. The authors concluded that high social support from leaders can serve a buffering effect for stress to a point. However, the presence of concurrent multiple stressors appeared to diminish the buffering influence of leader support.

9. **Bowers C.A., Baker, D.P., & Salas, E. (1994). Measuring the implications of teamwork: The reliability and validity of job/task analysis indices for team-training design.** *Military Psychology, 6(4),* **205-214.**

Past research has indicated that aviation aircrews rely upon the ability of team members to coordinate their activities in order to be effective. Military aviation adds the environmental stress of flying under combat conditions. Numerous aviation mishap reports have indicated that failures in crew coordination were at some degree responsible for the incident. This has led some to emphasize the need to identify, understand, and train those skills that enhance teamwork. Historically, the challenge has been to identify what these specific skills should be.

Early attempts at teamwork training focused on improving crewmember attitudes towards coordination. Skills development eventually became a prominent theme in teamwork training.

Bowers and colleagues defined coordination as task-work and teamwork. Task-work is those behaviors required in order for the execution of individual tasks. Teamwork is described as those behaviors required for cooperative functioning. The five indices employed in this study are commonly ascribed to task-work dimensions of military aircrews. The authors assessed the validity and reliability of five commonly used task-importance indices and a new factor was proposed. These indices included: a) importance to train, b) task criticality, c) task frequency, d) task difficulty, and e) difficulty of learning. Importance to training is the benefit of dedicating training time to a task relative to all other tasks in the job. Task criticality is the degree to which failure in the task causes negative consequences. Task frequency is the number of times the task must be performed in relation to other tasks. Task difficulty is the complexity of performing the task. Difficulty of learning is the amount of effort needed to learn a new skill.

This study included a total of 113 active-duty military pilots who were surveyed using the Team Task Inventory (TTI). Findings indicated there was a correlation between the indices of task importance and they likely share some components of a shared construct. Ratings of overall task importance were predicted by a combination of small portion of the indices with task criticality serving as one of note. Task criticality was influenced to some extent by perceptions of importance to train. Task difficulty received little respondent support as a significant factor but the authors suggest this might be due to military aviators understanding the necessity for ongoing training as a strategy to mitigate mishaps. Overall, Bowers et al. found their attempt to validate historic indices of creating task-related coordination to be disappointing. The authors reported low reliability and low validity for the indices they examined. This led the authors to suggest that new indices need to be researched and new measures developed that more accurately capture the perceptions of aviators concerning task importance.

10. **Brannick, M.T., Prince, C., & Salas, E. (2002). The reliability of instructor evaluations of crew performance: Good news and not so good news.** *The International Journal of Aviation Psychology, 12(3),* **241-261.**

Two instructors were employed to rate crew performance of 45 helicopter crews in a simulated mission. The raters were provided behavior-observation training and dimension training. The raters completed an observation form as they watched videotapes of the crews and then completed a form attempting to link behaviors to CRM dimensions. Raters evaluated crew behaviors using three types of items: a) specific crew behaviors in response to scenario events or triggers, b) evaluations of crew responses to scenario events, and c) crew resource management dimensions for the entire scenario. A review of rater results revealed that interjudge agreement and internal consistency were high for evaluations of crew responses to scenario events. Interjudge agreement was low but internal consistency was high for CRM items. Interjudge agreement was high but internal consistency was low for specific observable behaviors.

Brannick et al. found high levels of interjudge agreement and internal consistency with evaluating crew performance to embedded events in the scenarios with a reliability of .80. However, the ability to correlate crew behavior with specific CRM scales proved to lower

reliability between judges. Results indicated it would take approximately 11 instructors to CRM ratings to reach a reliability of .90. The authors posit that that trainers would likely benefit from further CRM training. The authors concluded that future research should include longer scenarios and longer scales.

11. **Britt, T.W. (1996).** *Responsibility, morale, and commitment during military operations.* **(USAMRMC Research Report no. 24). APO AE: U.S. Army Medical Research Unit-Europe. (AD A313 143)**

Military personnel can experience numerous deployments. Commitment to these missions is essential for achieving team goals. Britt offers the Triangle Model of Responsibility as a strategy from improving Soldier commitment, responsibility, and morale during deployments. Four factors are identified: a) rule clarity; b) mission relevance; c) personal control; and d) mission importance. Rule clarity is a clear set of rules detail what is expected and what determines superior performance. Mission relevance involves the Soldier viewing the mission as important and consistent with his or her training. Personal control acknowledges the Soldier as responsible for his or her choice of behavior and performing out of an intrinsic desire to do well verses merely following orders. Mission importance requires the Soldier views the mission as being something important and worthwhile.

Britt found that Soldier levels of responsibility, commitment, and morale were related to the strength of these four factors. Decreases in these four factors resulted in reductions in the desired characteristics. Suggestions are given for ways team leaders can enhance responsibility, commitment, and morale by engaging followers from the framework of the four factors.

12. **Cannon-Bowers, J.A., & Salas, E. (1998). Team performance and training in complex environments: Resent findings from applied research.** *Current Directions in Psychological Science***, 83-87.**

Organizations such as airlines have attempted to improve teamwork. Research reviews have found that two kinds of skills have a significant influence upon subsequent team performance. One skill is associated with the technical aspects of the task. The second set of skills focuses on the knowledge, skills, and attitudes (KSAs) that foster cooperation between team members.

The authors identified strategies that generally serve to improve teamwork. Cross-training enhances teamwork because members gain first-hand experience of the roles other members perform in the team. Encouraging feedback enables team leadership to guide team self-correction, which potentially enhances performance as adjustments are made. Team coordination and adaptation training allows for teamwork to be maintained during high workload conditions when effective teamwork can otherwise diminish. Assertiveness training assists members in providing input despite the reticence of seeking to avoid negative reactivity from others. Team leader training has increasingly recognized a coach-facilitator style of leadership as most conducive for encouraging cooperation in teams because such teams often reflect more openness about mistakes and stress a commitment to ongoing learning.

13. **Davis, W., & Fedor, D.B.** (1998). *The role of self-esteem and self-efficacy in detecting responses to feedback.* (ARI Research Note 98-23). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (AD A349 452)

Feedback is important in building team cohesion and is influenced by self-efficacy (SE) beliefs. SE beliefs are the self-estimate of an individual's ability to accomplish goals. The relationship between SE and sensitivity to external or internal feedback is discussed. Low SE is commonly related to an external propensity for feedback. That is, people with low SE are more likely to respond to and seek external feedback because they distrust their own judgments and the desire for positive reinforcement from others. However, low SE individuals may be reluctant to seek feedback in *face* threatening environments.

High SE individuals often rely on an internal propensity for feedback because of their self-assurance. These individuals generally report higher levels of belief in their internal ability to properly assess their own performance. This does not mean that high SE persons will not seek feedback from others, but they weigh the input of others against their own assumptions and limit the risks to image by their ability to filter the information they are given.

14. **Deluga, R.J.** (1995). **The relation between trust in the supervisor and subordinate organizational citizenship behavior.** *Military Psychology, 7(1),* 1-16.

Military teams require a high degree of commitment from their members. At times these teams require effort that exceeds normal role demands. The assumption has been that certain leaders know how to motivate subordinates to extra-role behavior even when rewards are not present. Extra-role behaviors are frequently described as organizational citizenship behavior (OCB) because they seek the welfare of the team or organization to the point of self-sacrifice. Past research has suggested that interpersonal trust is the foundation that inspires extra-role activity.

This study utilized 64 supervisor-subordinate dyads drawn from a military base. This non-combat sample examined and reported on 10 supervisor behaviors including; a) availability, b) competence, c) consistency, d) discreetness, e) fairness, f) integrity, g) loyalty, h) openness, i) promise fulfillment, j) receptivity, and k) overall trust. Subordinate organizational behaviors (OCB) included; a) altruism, b) courtesy, c) conscientiousness, d) sportsmanship, and e) civic virtue.

Findings indicated that a relation does exist between OCB and supervisor behavior and this may elicit interpersonal trust. Fairness and trust emerged as significant factors in relation to OCB. Specifically, when subordinates perceived a trusting interpersonal relationship where members are treated fairly (integrity), promises are kept (promise fulfillment), and supervisors listen (receptivity) the likelihood increases that subordinates will reciprocate. Supervisor loyalty is demonstrated in not taking advantage of subordinates. In turn, subordinates reported feeling their efforts were appreciated. As a result, these subordinates were less likely to complain (sportsmanship) and were more likely to remain engaged in team effort even when they have a valid excuse to be absent (conscientiousness). Civic role was found not to be significant is relation to interpersonal trust.

15. **Dvir, T., Eden, D., Avolio, B.J., & Shamir, B. (2002). Impact of transformational leadership on follower development and performance: A field experiment.** *Academy of Management Journal, 45(4),* 735-744.

Transformational leadership has become a popular topic for researchers. Part of the interest in grounded in the desire to identify the characteristics present in the leadership style of effective leaders, who inspire followers to go beyond the call of duty. Typically, researchers examining the existence of transformational leadership describe a distinction with transactional leadership. Transformational leadership seeks to lead through inspiring the follower to adopt team goals as a replacement for personal goals and to assume a sense of ownership in team outcomes. Transactional leadership is based upon directives and the presence of rewards for compliance or punishment for incompliance.

Dvir et al. sought to determine how transformational leadership might impact the development of followers. They proposed that transformational leadership touches three main domains of follower development – motivation, morality, and empowerment. Fifty-four military leaders were randomly assigned to an experimental and a control group. The sample also included 90 direct (noncommissioned officers) followers and 724 indirect (recruit) followers. The experimental group was given specialized training in transformational leadership prior to an eclectic leadership workshop. The control group was provided only the workshop.

Two months following the leadership training leaders from the experimental and control groups were assigned basic training platoons where their leadership skills would be evaluated. Recruits are required to demonstrate skill in light weapons, physical fitness, the obstacle course, and marksmanship. Leadership focuses on developing the recruits' understanding of the significance of the tasks and skills they are learning, as they will influence unit performance.

Findings indicated that personnel from the experimental groups performed better than did the control groups. Transformational leadership increased at least one measure each of motivation, morality, and empowerment. Engagement, internalization of moral values, and self-actualization needs did not appear to be significantly impacted by transformational leadership among direct followers. The authors suggested that further research could be beneficial in assisting the development of transformational leadership model.

16. **Flin, R., & Martin, L. (2001). Behavioral markers for crew resource management: A review of current practice.** *The International Journal of Aviation Psychology, 11(1),* 95-118.

Crew Resource Management (CRM) has been embraced by military and commercial aviation in Europe. Flin and Martin examined the challenge of introducing CRM to pilots in the United Kingdom and the exportability of behavioral markers across national cultures. CRM has been adopted into Europe's NOTECHS program for aviators. NOTECHS involves nontechnical skills related to teamwork. The researchers found that over half of the aviation organizations investigated did not implement behavioral markers in their training or they did not measure progress towards behavioral goals.

Behavioral markers can vary in terms of terminology but the concepts are generally divided into two categories. Cognitive skills included decision-making, situation awareness, and workload management. Social skills included leadership and teamwork. The authors found that behavioral markers can face cultural obstacles, but their introduction can be beneficial. The key is to package CRM skills with existing training and to allow time for their assimilation. Chances are adjustments will be needed so time should be allowed to gain clarity of constructs and rationality.

17. **Foti, R.J., Hauenstein, N.M.A., & Sgro, J.A. (1998). *Linking leadership emergence to leadership effectiveness and team performance in a military population.* (ARI Research Note 99-01). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (AD A354 192)**

Military teams naturally consist of appointed or designated leaders. Foti et al. posit that leadership effectiveness emergence from dynamics other than organizational appointment. They suggested that effective leadership emerges in response to the interaction between leaders and subordinates. Freshmen ROTC cadets (n = 81) composed 3-person leaderless teams and participated in decision-making task assignments. Double rotations were used of 3 teams at one time. Following the first rotation subjects were assigned to a different team for the second task assignment. Four exercises were used with two designed to measure initiating structure behaviors and two exercises were designed to motivate consensus/team building behaviors.

Results indicated that certain personality traits seem to moderate the relationship between leadership emergence and leadership effectiveness. The authors theorized that short-term groups experience leadership emergence primarily due to individual qualities rather then familiarity. In other words, leadership emergence is likely linked to subordinate perceptions. Foti and colleagues found that dominance and intelligence were related to leadership emergence. Similarly, leadership emergence was related to perceptions of leadership effectiveness. The authors concluded that individual characteristics play a significant role in leadership emergence in leaderless groups and can influence the relationship between leader and subordinate.

18. **Griffith, J. (2002). Multilevel analysis of cohesion's relation to stress, well-being, identification, disintegration, and perceived combat readiness. *Military Psychology, 14(3), 217-239.***

Combat units differ from many other types of teams because the inherent risks can present a formidable obstacle to maintain cohesion. Stress, satisfaction with membership, and future plans related to attrition can influence cohesion levels over time. Griffith examined the relation of cohesion to combat performance at the individual and group level in this study. Specifically, the researcher desired to identify possible links between cohesion and Soldier stress, perceptions of well-being, identification, and disintegration (intentions to leave the unit) at the local and the group level.

Griffith's study included enlisted Soldiers (n=7,892) from 104 combat arms companies. These were given questionnaires to complete and the study experienced a 75% response rate. Soldiers with higher educational levels reported higher levels of well-being and identification

than Soldiers with lower educational levels. Rank was found to be positively correlated with identification, well-being, and perceived individual combat readiness. Only disintegration was negatively correlated with rank. Minority Soldiers reported greater well-being and were less likely to report plans of leaving the Army. However, minority Soldiers identified less with their units and the Army and reported lower levels of individual combat readiness. Soldiers reporting time pressures reported higher plans to leave the Army, but also perceived themselves as better prepared for combat.

Leadership behavior presented significant influence on cohesion development. Leader emotional support had the strongest positive relation to well-being and leader task support was second in terms of strength. Leader emotional support showed the strongest negative relation to disintegration, followed by leader task support. On the company level, leader task support and emotional support showed the strongest link to outcomes including identification (positive) and disintegration (negative). Company-level Soldier task support showed the strongest positive relationship to well-being and perceived group combat readiness. Leader emotional support was positively related to well-being, but negatively related to individual and group combat readiness.

The researchers concluded that cohesion seems to develop in military units through the combined effort of leaders and fellow Soldiers in providing task and emotional support. Perceptions of leader task and social skills can create a positive environment where individuals experience a sense of well-being, identification in the group, and solidarity. Perceptions of combat readiness increased as Soldier task and emotional support combined with quality leadership.

19. **Harriel, D.W. (1997).** *The certificate of commission: A commitment to leadership.* **(Research Report). Maxwell AFB, AL: Air Command and Staff College. (AD A392 961)**

Military officers incur a high level of responsibility when they assume command over other personnel. Their effectiveness as leaders requires a high level of commitment to professionalism and to the Soldiers in their unit. Harriel theorized that some officers lack sufficient understanding of their commission to fully discharge their full responsibility as leaders. Harriel highlighted the great military leaders of the past as she developed a strategy for increasing awareness among officers. Harriel concluded by suggesting a need exists for a structured course that would stress the responsibilities and purpose of a commission.

20. **Hedge, J.W., Bruskiewicz, K.T., Borman, W.C., Hanson, M.A., Logan, K.K., & Siem, F.M. (2000). Selecting pilots with crew resource management skills.** *The International Journal of Aviation Psychology, 10(4),* **377 – 392.**

Teamwork skills are emerging as a needful focus of training among aviators. Crew Resource Management (CRM) addresses the complex teamwork needs of aircrews. The assumption is that improving cooperation among crewmembers will improve crew performance. Hedge et al. examined the development and validity of a CRM test for Air Force transport pilots.

The authors reported that the Situational Judgment Test (SJT) proved positive in identifying individual differences and how they influence performance. The SJT presents job-relevant situations and the respondent is offered numerous actions, which would be effective or ineffective in each situation. Subtle differences exist between the responses and responses represent subtle differences in the personalities of the respondents. The authors adapted the SJT to the aviation environment with the development of the Situational Test of Aircrew Response Styles (STARS) test. STARS targets CRM skills necessary for success as Air Force pilots. These skills include decision-making, problem solving, communication, aircrew management, and interpersonal effectiveness. Their validation study found a significant relation between performance on the CRM skills test and aircraft commander performance.

The authors concluded that STARS has promise as an inexpensive training tool. STARS seemed to possess validity in terms of identifying crew coordination skills in pilots. STARS can be used as an evaluation tool to address individual strengths and weaknesses. Overall, STARS appeared to provide support for the effort of improving crew performance.

21. **Helmreich, R.L., Merritt, A.C., & Wilhelm, J.A. (1999). The evolution of crew resource management in commercial aviation.** *The International Journal of Aviation Psychology, 9(1),* **19-32.**

Crew Resource Management (CRM) was originally created to help reduce "pilot error." The first generation of CRM employed testing and personality style assessments for the purpose of correcting "deficiencies" that hampered interpersonal teamwork. The second generation of CRM witnessed a shift to focusing on group dynamics at work within the cockpit including teamwork, decision-making, and various dimensions of communication. The third generation of CRM focused upon specific behaviors related to new technology and cockpit automation. The fourth generation of CRM witnessed the integration of CRM into established training programs of commercial carriers and CRM concepts were adapted into the checklists of commercial aviators.

Helmreich et al. proposed that CRM is effective in reducing aviation accidents. However, not everyone has historically accepted the value of CRM because these skills decay over time without ongoing training. There are have been problems importing CRM into national cultures with values opposed to behaviors such as questioning authority and assertiveness. Since CRM is not always accepted, the fifth generation of CRM research has concluded that erasing human error is impossible.

Stressing error management rather than error eradication seems to mitigate cultural resistance to CRM training because it requires open communication in order for feedback and monitoring to occur. Part of training is adopting a nonpunitive approach to dealing with errors such as in simulation scenarios when risk factors are irrelevant. Stress needs to be monitored and beliefs of pilot invulnerability need to be defined as a negative influence upon the team. Briefings and feedback should be encouraged.

22. Helmreich, R.L., Wilhelm, J.A., Klinect, J.A., & Merritt, A.C. (2001). Culture, error, and crew resource management. In R.L. Helmreich, J. A. Wilhelm, J.R. Klinect, & A.C. Merritt (Eds.), *Improving Teamwork in Organizations* (p. 305-331). Hillsdale, NJ: Erlbaum.

Human error is inevitable so aircrews must learn how to detect and mitigate error when it occurs. Crew resource management (CRM) has been offered as one strategy for learning how to manage error. Helmreich et al. suggested that organizational, professional, and national cultures can serve as a positive or negative influence upon flight safety because these can prompt communication or cooperation constraints that cripple the team.

Organizations can influence how committed aviators will be to safety and training based upon their level of commitment to creating a safety culture. A safety culture promotes training, reinforces safe practices, and establishes open communication between operational personnel and management regarding threats to safety. Personnel will often mirror the organization's commitment to creating a safe environment by their adherence to procedures and their willingness to practice skills presented in teamwork training programs.

Professional culture includes the attitudes commonly ascribed to aviators. Historically and anecdotally, aviators are often characterized as brave, daring, and risk-taking. Other descriptions of aviators include feelings of invulnerability, bravery, and efficacy. The authors suggest that these perceptions are commonly reported among aviators, but they can serve as negatives if they lead to a disregard for safety, procedures, and teamwork.

National culture emphasizes the role of nationality as an influence upon personnel perceptions of teamwork. The authors note that national culture includes Power Distance, Individualism-Collectivism, and Uncertainty Avoidance. Power Distance is the degree of deference subordinates demonstrate to superior and can increase flight risk if crewmembers are reluctant to provide critical input. Individualism-Collectivism defines differences between individualistic cultures where people make decisions based upon personal costs and benefits and collectivist cultures where the good of the group is primary.

The authors concluded by discussing other environments where CRM has been applied. They suggest that organizations need to adopt CRM-type behaviors including: a) building trust, b) adopting a non-punitive policy toward error, c) providing training in error avoidance, detection, and management strategies for crews, d) providing special training in evaluating and reinforcing error avoidance, detection, and management for instructors and evaluators, e) demonstrating a willingness to reduce error in the system, and f) collecting data that show the nature and types of threat and error. The implications are that adopting a proactive stance to error management will reduce future errors as crews learn from past mistakes.

23. Hollenbeck, J.R., Ilgen, D.R., LePine, J.A., Colquitt, J.A., & Hedlund, J. (1998). Extending the multilevel theory of team decision making: Effects of feedback and experience in hierarchical teams. *Academy of Management Journal, 41(3)*, 269-282.

Hierarchical teams are faced with decision making responsibilities. The decision-making process can breakdown if desired outcomes are not reached at the different levels where decision-making occurs within teams. The multilevel theory of decision making presumes that decision making accuracy is a multilevel process requiring clarity of information, member feedback, and a critical evaluation of recommendations. Feedback is a critical component of the multilevel theory.

This study sought to determine the influence of feedback on the decision making process of the team. Ninety-five four-person teams were assigned a naval command and control simulation. Each team was assigned airspace to monitor. The workstations were networked and subjects were given partial information in a "drop-down menu" that provided information concerning aircraft that entered their airspace. The recommendations were gathered and forwarded to a team leader coupled with different forms of feedback. The team leader was assigned the responsibility making a final recommendation of whether or not the aircraft should be approached for security reasons.

Findings supported the multilevel theory. Feedback was found to be a significant factor. Teams that employed process or real-time feedback outperformed teams that received only global performance feedback when team recommendation scores were compared with program scores. Feedback was significant to the point it mitigated the benefits of team experience.

24. Jentsch, F., Barnett, J., Bowers, C.A., & Salas, E. (1999). Who is flying this plane anyway? What mishaps tell us about crewmember role assignment and aircrew situation awareness. *Human Factors, 41(1)*, 1-14.

Situation awareness (SA) is imperative for flight safety. Past research has indicated that situation awareness is maintained through intrateam communications, rehearsed norms, and clarity concerning role assignment. The suggestion is that captains are in charge of setting goals for the aircrew and are responsible for its safety, which places them at a disadvantage when they are also responsible for maintaining SA at the same time. The researchers theorized that when captains are serving as the pilot flying (PF) the likelihood that the crew will lose SA greatly increases. The purpose of this study was to examine the link between role assignment in the cockpit and crew SA.

A meta-analysis of 311 mishap reports was conducted. Specifically, they sought to determine if losses of SA were more prevalent when the captain was the PF or when the first officer (FO) was at the controls. First, the reports were sorted between those that specified role assignment and those that did not. The 221 reports that remained were then divided between those where the captain was PF (n = 142) and those where the FO was at the controls (n = 79). In the remaining 90 reports the crewmember that acted as PF could not be determined. Results indicate that member assignment does have an effect on the loss of SA. Regardless of weather or type of aircraft, loss of SA as a primary cause of the accident was more prevalent when the

captain was PF. Contrary to the hypothesis that being at the controls improves SA, this study found that increased workload likely decreases SA for the PF.

The finding that aircraft reported greater losses of SA when the captain is the PF raises other concerns for the crew. One concern is corrected SA errors before they become hazardous. Studies have shown that junior FOs are reluctant to correct errors made by captains. In one study FOs attempted to correct errors when captains are in the PF position in only 20% of the cases. However, attempts to correct errors occurred in over 60% of the cases when the FO was at the controls. The authors suggested this is significant since their review of incidents revealed that 82% of all cockpit errors occurred when the captain was at the controls. Lack of assertiveness on the part of FOs to correct captain errors accounted for about 20% of all cases where FOs failed to correct captain errors.

The researchers concluded that the loss of SA is responsible for an incident more often when the captain is at the controls. The PF is more likely to lose SA than the pilot not flying (PNF). Given the significant management role of the captain and the likelihood that more errors occur when they are at the controls, the researchers recommended that further research should be conducted.

25. **Jordan, M.H., Field, H.S., & Armenakis, A.A. (2002). The relationship of group process variables and team performance. *Small Group Research, 33(1),* 121-150.**

Past research of team effectiveness has suggested that three components should be considered: a) team performance, b) perceived viability of the team to continue in the future, and c) team member satisfaction. The authors explored the possible relationship between group potency (the collective belief by members that their team can be effective), group cohesion (the forces that encourage members to stay in a group), and team member exchange (the quality of member interactions) with team performance.

Jordan et al. employed 648 Air Force officers attending a professional Air Force military education course. Officers were assigned to a team when they arrived at the base. Each team consisted of 13 members who remained together for the five-week duration of the course. Team performance was assessed on two objective criteria (mental and physical task performance) and one subjective criterion (commander performance ratings). Two surveys were given during the training. Group potency exhibited the highest correlation with team performance. The authors concluded that group potency can be increased if early success is experienced and if a team structure emphasizes effective communication and cooperation.

26. **Karrasch, A.I. (2003). *Lessons learned on collective efficacy in multinational teams.* (ARI Technical Report 1137). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (AD A414 109)**

Collective efficacy influences team commitment because it is an individual's belief in the ability of a team to be successful. This study examined the influence of multiculturalism on collective efficacy. Specifically, attention was focused on U.S. Army personnel serving in

multinational forces in Europe. Karrasch studied the levels of collective efficacy among personnel composing the Stabilization Force in Bosnia-Herzegovina.

Results indicated that perceptions of collective efficacy were strong for those at the primary or ground level suggesting that efficacy for these personnel likely fluctuates and is responsive to situational conditions. Collective efficacy beliefs were not as high at the organizational level. Karrasch suggested that primary level personnel might have developed a shared sense of capability whereas officers might be more reticent since sharing command responsibilities can be a difficult cross-cultural activity.

27. Kay, R.E. (1998). *Strategic leadership: It doesn't take a bully.* **(USAWC Strategic Research Project). Carlisle Barracks, PA: Army War College. (AD A345 516)**

Studies of leadership styles often recognize a relationship between temperament and leadership style of choice. The focus of this study was to identify inappropriate and abusive behaviors that leaders can demonstrate regardless of the leadership style they employ. Kay argued that style is a personal choice, but abusive behavior of others is not an acceptable option. Kay put forward that it does not take abusive behavior to motivate people and such behavior will likely diminish performance and hinder the mission.

28. Keithly, D.M., & Tritten, J.J. (1997). A charismatic dimension of military leadership. *Journal of Political and Military Sociology, 23,* **131-146.**

Leadership research has been inconclusive in identifying the factors that contribute to charisma in leadership. This study proposed that charisma is actually determined by follower responses to leadership styles and behaviors rather than explicit behaviors that produce a cause-effect relationship. In this regard, charismatic leadership is a subjective determination by followers.

Instead, Keithly and Tritten argued that charismatic leadership is a phenomenon that occurs when teams encounter times of crisis and change. Such leaders through personality or interpersonal skills gain the confidence of team members. The charismatic leader conveys confidence and engenders interpersonal trust that he or she knows what needs to be done. In such cases the opinions, ideas, and directions of the charismatic leader are seldom questioned. Obviously, quality feedback and process evaluation are lost early in this process.

Success for charismatic leaders tends to diminish quickly. The authors suggested that such leaders often inspire a transcendent or spiritual quality to distressed teams. However, once the stress relieves or the team environment becomes routine the influence of the purely charismatic leader quickly diminishes. Once this occurs charismatic leadership will be forced to adopt a different form of authority. Otherwise, these leaders are likely to find themselves in teams that lack stability over time or they will find themselves in search of other teams in crisis.

29. Klimoski, R., & Mohammed, S. (1994). Team mental models: Construct or metaphor? *Journal of Management, 20(2),* 403-437.

Organizational research has recognized numerous factors that seem to increase the likelihood that shared mental models will develop in teams. Shared mental models contribute to team cooperation by providing members implicit understanding of how the team functions and how individual members are likely to respond in times of stress. Beyond serving as a descriptive characteristic of teams, the features constructing team mental models have been difficult to identify. Klimoski and Mohammed theorized that team mental models share an emergent characteristic, organize knowledge, serve a categorization function, and reflect internalized beliefs. The authors offered that mental models are likely more crucial during the implementation phase rather than during decision-making.

30. Knouse, S.B. (1998). *Keeping 'on task': An exploration of task cohesion in diverse military teams.* (DEOMI Report). Patrick Air Force Base, FL: Defense Equal Opportunity Management Institute.

Cohesion research often focuses on the role of social dynamics. Knouse theorized that task dynamics might be a better focus in devising strategies for creating cohesion in high-risk teams such as those in the military. He explored the assets and liabilities associated with member diversity. Various task-oriented models for building cohesion were presented. Knouse proposed a Task Cohesion Model and discussed its features such as communication, quality interactions, task requirements clarity, direct feedback, task-focused goals, and task interdependence. Communication and leadership training are essential elements. Further, military teams will likely benefit from the experience and input of diverse members.

31. Knouse, S.B. (2001). *Diversity and shared mental team mental models in the military.* (DEOMI Research Report). Patrick Air Force Base, FL: Defense Equal Opportunity Management Institute. (AD A403 424)

Productive teams rely upon mutually shared knowledge structures (shared mental models) of expectations between members. These mental models are constructed as team members gain experience working together and member interactions are perceived to be positive. Surface-level diversity (race, gender) can potentially obstruct the creation of mental models. Knouse argued that military teams potentially hurt themselves by not encouraging the input of all members. Recommendations are made for ways to mitigate the potential negative influence of diversity. Suggestions include: a) member selection should emphasize diverse skills, b) interaction time should be allowed, c) mental models training should be provided, d) allow time for taskwork experience, e) involve members in planning, and f) focus on task rather than social cohesion.

32. Leboeuf, J.N. (1997). *Feedback: A critical leadership resource.* (USAWC Research Report). Carlisle Barracks, PA: U.S. Army War College. (AD A326 794)

Feedback is crucial for effective communication. It allows for self-regulation and adaptation to changing environmental conditions. Feedback reduces uncertainty, provides a signaling or cueing function, and creates competence. Much of this feedback in teams will come

from peers. He offered that strategic leaders of the future need to become comfortable receiving feedback since they will need to be continuous learners, reflective thinkers, able to lead others, and will need to be able to implement organizational changes. Leboeuf concluded that strategic and effective leaders of the future need to move past the threatening aspect of feedback and develop the skills necessary to filter and process feedback in an efficient way.

33. **Leedom, D.K. (1994). What is this thing called "crew coordination"?** *U.S. Army Aviation Digest, May/June.*

Leedom recounted the history of crew coordination as it developed in Army aviation during the early 1990s. Much of the concern grew out of the significant loss of personnel and equipment during Desert Shield/Desert Storm. A review of aviation accidents from 1984 to 1989 resulted in the loss of 147 lives and $292 million in aviation resources. Poor coordination was cited as a contributing factor to many of these accidents. In response the U.S. Army Aviation Center established a team of researchers to develop a new training program that would enhance crew coordination.

The U.S. Army Research Institute through research and interviews with personnel developed a training program that addresses 13 dimensions of coordination. These dimensions include components such as quality leadership, situational awareness, effective communication, and quality decision-making. The training program was packaged for use in the classroom or in simulation environments.

Leedom cited two studies where crews were given coordination training and then participated in simulated insertion and attack missions. Instructor pilot evaluation found that crews in both studies outperformed crews not given the coordination training. These crews practiced better communication, managed cockpit workload better, expressed more situational awareness, and were more successful in task accomplishment. Leedom concluded that early research seems to support the validity of further research in crew coordination. This article was historic in terms of the development of crew coordination training in Army aviation. However, it provides valid justification for the development of crew coordination as a training package for Army aviators.

34. **Leedom, D.K., & Simon R. (1995). Improving team coordination: A case for behavior-based training.** *Military Psychology, 7(2),* **109-122.**

Teamwork training such as Crew Resource Management (CRM) has gained popularity as an effective training method for aviators. CRM is a behavior-based program that stresses the development of skills that often improve crew interaction during the flight under varying workload conditions. In part, team coordination can improve through member interactions (battle rostering) alone. However, does performance among battle rostering crews exceed the performance of crews exposed to behavior-based coordination training? Leedom and Simon found in their three studies of military helicopter aviators that crews given behavior-based coordination training outperformed battle rostered crews. They suggested that using behavioral changes are likely a better standard for measuring training impact than attitudinal changes.

35. Mael, F.A., & Alderks, C.E. (1993). Leadership team cohesion and subordinate work unit morale and performance. *Military Psychology, 5(3),* 141-158.

A requirement of leadership teams is that individual leaders form a cohesive and coordinated structure of decision-making and authority so they present a united front to their subordinates. Sixty light infantry platoons were surveyed as to the degree of cohesion in the leadership teams and how leadership cohesion (LC) influenced their perceptions of the team as a whole. They found that leadership team cohesion was significantly related to team cohesion, organizational identification, job involvement, task motivation, career intent, and perceptions of unit effectiveness. LC also influenced performance in simulated combat. The authors concluded that leaders need to pay attention to how their cohesion affects morale and performance.

36. Marks, M.A., Sabella, M.J., Burke, C.S., & Zaccaro, S.J. (2002). The impact of cross-training on team effectiveness. *Journal of Applied Psychology, 87(1),* 3-13.

Efforts to improve coordination have considered cross-training as one way to improve mutual understanding of member roles and to enhance the creation of shared mental models. Marks et al. conducted two studies of teams in computer simulated exercises. Findings from both studies suggested that cross-training enhanced shared team-interaction models. Second, coordination appeared to serve a mediate the relationship between shared mental models and team performance. Other findings and limitations were discussed including the possibility that the benefits of cross-training might vary depending upon the level of cross-training provided.

37. Masi, R.J., & Cooke, R.A. (2000). Effects of transformational leadership on subordinate motivation, empowering norms, and organizational productivity. *The International Journal of Organizational Analysis, 8(1),* 16-47.

Masi and Cooke examined the relationship between transformational leadership and empowerment, motivation, and productivity. They proposed an integrative model of transformational leadership and test their model at the United States Army Recruiting Command. The authors also explored a possible link between constructive leader self-concept and leader behavior. Behaviors indicative of transformational leadership include empowering cultural norms, high levels of subordinate motivation, commitment to quality, and enhanced productivity. Self-concept is believed to be positive or constructive for transformational leaders and negative or defensive for transactional leaders.

The authors conceptualized transformational leadership as revolving around team vision and involving a sense of pride, self-respect, and faith in the leader. Transformational leaders empower cultural norms by stressing goals, shared assumptions, basic values, and emphasize member roles while promoting teamwork through shared experiences. Transactional leadership functions by an exchange principle of one thing for another where compliance is rewarded and non-compliance is punished. Teamwork is promoted by transactional leaders primarily through coercion.

Army personnel (n = 2,596) assigned to 582 recruiting stations and 93 recruiting companies were surveyed in this study. Four different survey instruments were used and each

subject was assigned one or two instruments depending upon their position within the command. Quarterly productivity reports were also included in the study. Findings indicated a positive relationship between transformational leadership and motivation, but there was a negative relationship between transactional leadership and both commitment to quality and organizational productivity. A strong link between leader self-image and leadership style was not supported, but there was an association with productivity. There was not a significant link between leadership style and empowering norms, but norms were related to commitment to quality and motivation.

38. McCann, C., & Baranski, J.V. (2000). On the utility of experiential cross-training for team decision-making under time stress. *Ergonomics, 43(8)*, 1095-1110.

Aircrews can experience reconfiguration on a frequent basis as members rotate out of the crew. The assumption is that crew communication and decision-making can potentially be hindered due to the instability of crew membership over time. Introducing temporal urgency as an influence upon decision-making increases the need that communication and member interactions be effective. McCann and Baranski explored the potential benefits of employing cross-training as strategy to mitigate communication and/or coordination breakdowns.

Their study consisted of three teams and three exercise sessions. One was cross-trained (CT) during the training phase with members performing at each of three positions during the training session and then reconfiguring to each position during the exercise phase. A second group received no CT training but members were required to reconfigure to each of three positions during the exercise phase. A third team served as the control teams and was neither cross-trained nor reconfigured.

The results were mixed for the CT team. During the training phase non-CT teams performance increased more than the CT team. During the exercise, the CT team did not achieve a comparable level of performance with the control team. However, member reconfiguration was found to diminish performance for non-CT teams, but not for the CT team. While overall performance was not significantly different between the CT teams and the non-CT teams, there was a marked difference in communication frequency. The reconfigured group required more overt communication and task clarification and they communicated less situational awareness during the first exercise. McCann and Baranski concluded that cross-training can be costly, but it can be beneficial in crews that expect high member turnover.

39. McCormack, L., & Mellor, D. (2002). The role of personality in leadership: An application of the five-factor model in the Australian military. *Military Psychology, 14(3)*, 179-197.

McCormick and Mellor investigated the relation between the five-factor model (FFM) and leadership effectiveness. The FFM proposes that personality can be categorized as Neuroticism, Extraversion, Openness, Agreeableness and Conscientiousness. The authors supported the utility of a trait approach to identifying individuals who are likely to excel in leadership. Based upon this perspective, the authors suggested that frequently military officers are rated by superiors

based upon personality traits and how these influence job performance. These ratings serve as the basis for selection to the Army Command and Staff College.

Ninety-nine Australian Army officers were given the NEO Personality Inventory-Revised and were rated by their superiors. The authors hypothesized that leadership effectiveness in the Australian Army can be predicted by high Extraversion, Agreeableness, and Conscientiousness, while low in Neuroticism. Openness is related to a greater likelihood of learning new job skills and become more effective officers.

The findings supported three of the five factors on the FFM. Extraversion was higher than average but not as high as they predicted. High Conscientiousness was related to effective leadership as was Openness. Agreeableness did not prove significant in this study. The authors concluded that some correlation possibly exists between personality traits and leadership effectiveness, but further research is needed.

40. **Mearns, K., Flin, R., & O'Conner, P. (2001). Sharing 'worlds of risks': Improving communication with crew resources management.** *Journal of Risk Research, 4(4),* **377-392.**

Team members do not always easily perceive safety risks in organizations. Communication failures, poor teamwork, and poor leadership are typical precursors of accidents. The authors suggested that organizational teams can benefit from human factors training such as Crew Resource Management (CRM).

A brief explanation is given identifying the components of CRM. The components cited include communication, situational analysis, teamwork, decision-making, leadership, and personal limitations. Evidence was provided that CRM is effective in aviation as indicated by reductions in mishaps, personnel injuries, and aircraft ground damage among crews that undergo CRM training. The researchers also noted the assessment benefits of CRM as crew behavior, participants' feedback, participants' attitudes, and knowledge provide opportunities of objective measurement of performance improvements.

CRM was applied to an analysis of 1268 incidents from seven offshore oil companies from 1994 to 1996. They found 46% of the incidents fell within one of the broad CRM topics. They found that a lack of communication resulted in failures to transfer information even during shift hand-over. Additionally, they cited poor leadership, inaccurate situational awareness, and poor decision-making.

Based upon reviews of offshore safety surveys in the UK oil industry a CRM training package was created and presented to 104 employees of five North Sea production platforms. Training consisted of an introduction to CRM and six work packages based upon six nontechnical skills including situation awareness, decision-making, communication, team working, fatigue, and stress. Participant feedback was positive. However, significant shifts of attitude were not reported and participants were no better able to find human factors causality in accident scenarios.

The authors suggested that further testing at some future point might indicate attitudinal changes and they human factors training needs to be adapted to the organizational context where the teams function. Individuals with operational experience should be included in training development. Finally, management must allow time for the training to influence change within the risk culture of the organization.

41. **Militello, L.G., Kyne, M.M., Klein, G., Getchell, K., & Thordsen, M. (1999). A synthesized model of team performance.** *International Journal of Cognitive Ergonomics, 3(2),* **131-158.**

The authors examined 6 different models that address team performance to determine if similarities can be identified to assist in formulating a framework for mapping the domain-independent components of the 6 models and then to develop a single comprehensive model of team performance. Most of these models developed and were studied in military environments. The 6 models include: a) the TEAM model, b) the teamwork model, c) team performance model, d) model of organizational competence, e) crew resource management, and f) the Advanced Team Decision Model.

A meta-analysis of available literature concerning the six models supported the authors' effort in formulating a comprehensive model. The authors suggested that a comprehensive model should consist of components (the highest level of abstraction that captures the major aspects of the model), dimensions (the subelements of components such goals and objectives, detecting ambiguities, and achieving situation assessment), behavior (the actions required to achieve goals), and anchors (a quantitative and qualitative description of a particular behavior). The domain-independent components are identified as team competencies, team identity, team planning and decision-making, and team self-management.

42. **Mjos, K. (2001). Communication and operational failures in the cockpit.** *Human Factors & Aerospace Safety, 1(4),* **323-340.**

Human error is a cause of many civil aviation accidents. Mjos reported that 73% of air transport accidents are due to problems with crew communication. This study examined the possible relationship between 13 communication categories and team performance among 26 pilots from a Norwegian airline. Subjects were recorded under high workload and stress during flight simulation. Results indicated that as tasks become more demanding, levels of stress and anxiety breakdown communication and create rigidity in problem solving.

43. **Mumford, M.D., Marks, M.A., Connelly, M.S., Zaccaro, S.J., & Reiter-Palmon, R. (2000). Development of leadership skills: Expertise and timing.** *Leadership Quarterly, 11(1),* **87-114.**

Teams often experience problems related to task or social dynamics. Leader performance will often be measured by his or her ability to solve unique and ambiguous problems that confront the team. The leader's ability to generate solutions will be determined by the level of knowledge and relevant problem-solving skills that are available. Mumford and associates suggested that problem-solving responsibility is one of four crucial sets of skills necessary for

effective leadership and for promotion to higher levels within the Army. Their study of a cross-section of Army officers finds that officers at higher grades exhibit increased levels of knowledge, systems skills, problem-solving skills, and social skills. The development of these skills appeared to reflect a developmental and systematic process.

44. **Mumford, M.D., Zaccaro, S.J., Harding, F.D., Jacobs, T.O., & Fleishman, E.A. (2000). Leadership skills for a changing world: Solving complex social problems.** *Leadership Quarterly, 11(1),* 25-35.

Conflicts within groups are unavoidable. The authors suggested that teams are actually collections of subsystems. One of the challenges of team leadership is finding ways to mesh the independent goals of individual subsystems into interdependency. As interdependency develops teams can encounter unproductive interactions and conflicts that diminish member bonding.

The authors concluded that effective leadership requires that leaders practice problem-solving skills. Problem-solving begins with identifying problems, understanding the problem, and generating potential solutions. The second set of skills involves social judgment where potential solutions are refined and implementation frameworks are created. Finally, effective leaders employ social skills associated with motivating members during solution implementation.

45. **Mumford, M.D., Zaccaro, S.J., Johnson, J.F., Diana, M., Gilbert, J.A., & Threlfall, K.V. (2000). Patterns of leader characteristics: Implications for performance and development.** *Leadership Quarterly, 11(1),* 115-133.

Leadership research has typically presumed a relationship between certain individual traits, leadership emergence, and the potential for these to predict leadership performance. The authors noted that the concept of individuals seeking an organizational role complimentary to their personality is not a new idea. Expanding this idea is the possibility a skills development process occurs over time influencing estimations of where they might best fit in an organization.

Mumford et al. applied this concept to U.S. Army officers at various leadership levels. The purposes of this study are to attempt to; a) identify types of leaders across the organization, b) to determine how the selection process functions at the senior leader level, and c) to examine the various leadership skills associated with each style and level. A battery of psychometric measures including the Jackson Personality Research Form, California Psychological Inventory, the Myers-Briggs Type Indicator, and the NEO-PI-R were administered to measure openness.

Seven descriptive types of leadership emerged: a) Concrete Achievers (concrete, pragmatic, achievement-oriented); b) Motivated Communicators (e.g., extroverted, responsible, verbal); c) Limited Defensives (e.g., introversion, sensing, thinking); d) Disengaged Introverts (e.g., introversion, planning, intuition); e) Social Adaptors (e.g., extroversion, openness, verbal reasoning); f) Struggling Misfits (lack of ability and openness); and g) Thoughtful Innovators (e.g., introversion, intuition, achievement).

All seven leadership types were represented among the junior officers in the sample. Concrete Achievers and Motivated Communicators were the largest types. The mixture of types changed at the senior level with Motivated Communicators, Social Adaptors, and Thoughtful Innovators appearing more frequently. Motivated Communicators and Thoughtful Innovators experienced the greatest proportional increase at the senior level suggesting that senior leaders need to be extroverted and achievement oriented (Motivated Communicators) but there is also a place at this level for intellectually oriented leaders who possess a social systems focus (Thoughtful Innovators).

Movement through the various levels of leadership was linked to the skills development of leaders in problem solving, social construction, and social judgment. Motivated Communicators and Thoughtful Innovators might represent the majority of senior level leaders because they have the greatest commitment or ability to maintain skills development over time. Thoughtful Innovators are more frequently represented at senior levels and exhibit the greatest increases across organizational levels in developing the essential skills of contemporary leadership.

46. **Naff, K.C., & Thompson, R.C. (2000).** *The impact of teams on the climate for diversity in government: The FAA experience.* **(DOT/FAA/AM-00/27). Washington, DC: Federal Aviation Administration.**

Organizations are experiencing increasing levels of diversity among employees and are finding ways to integrate diversity as an asset to productivity and cohesion. Naff and Thompson examined perceptions of diversity among FAA personnel. The authors found that teamwork does appear to moderate the negative influence of diversity. Teamwork reports to improve perceptions of diversity climate. However, the context of the organization seems to influence perceptions of diversity climate. FAA personnel, a largely homogenous group, reported the lowest scores related to diversity dimensions used by this study but the highest scores in terms of perceived teamwork. Naff and Thompson noted that teamwork seems to influence attitudes towards supporting diversity-related initiatives.

47. **Neason, C., Jr. (1998).** *Operational leadership: What is it?* **(USACGSC Monograph). Fort Leavenworth, KS: U.S. Army Command and General Staff College. (AD A357 894)**

Leadership is crucial for military teams, but the author argued that definitions of leadership seem to be inadequate in terms of effects. Neason suggested that military leadership should be construed as operational leadership because it requires a thorough understanding of the demands placed upon the team. Competence and self-confidence are essential. He presented operational leadership as being responsible for guiding vision for improving the team, mentoring future leaders, and influencing organizational culture/command climate to make necessary improvements for the future. Operational leadership is flexible in terms of traits and styles depending upon situational demands.

48. Niebuhr, R.E., Knouse, S.B., & Dansby, M.R. (1994). *Workgroup climates for acceptance of diversity: Relationship to group cohesiveness and performance.* (DEOMI Research Series Pamphlet 94-4). Patrick Air Force Base, FL: Defense Equal Opportunity Management Institute. (AD A293 823)

Military teams are increasingly reflecting racial or gender diversity. Niebuhr et al. examined the role of gender and racial diversity upon team cohesion in two separate government organizations including a military sample. Discriminatory climate, group cohesiveness, and group performance were measured. Results suggested that gender and racial perceptions of discrimination may play an important role in cohesion development. Non-whites perceived greater racism than did white groups. Females reported greater sexism than males suggesting that power and status might serve a significant influence upon perceptions.

Strategies for mitigating the detrimental effects of racism and sexism are suggested. Leaders need to seek the development of positive work environments where racial and gender discrimination is not allowed. Cross-cultural and cross-gender friendships are encouraged. The implementation of short-term tasks can lead to positive attributions for the team resulting in team collective efficacy. These strategies encourage diverse member experience and talent input.

49. Nullmeyer, R.T., & Spiker, V.A. (2003). The importance of crew resource management behaviors in mission performance: Implications for training evaluation. *Military Psychology, 15(1),* 77-96.

Research on the effectiveness of Crew Resource Management (CRM) has sought to find empirical support for its validity as a teamwork training program. Two studies produced data related to the effectiveness of CRM training among MC-130P crews. One study was based upon instructor comments of student performance. The other consisted of over-the-shoulder evaluations in tactical simulators by instructor pilots. Instructor comments revealed that CRM-related problems begin early in training and were most often related to decision-making and poor communication. Over-the-shoulder reviews focused on experienced crews and found the most effective crews demonstrated CRM behaviors such as a single leader and a willingness to adjust to changing situations.

50. O'Connor, P., Hans-Jurgen, H., Flin, R., Lodge, M., & Goeters, K.M. (2002). Developing a method for evaluating crew resource management skills: A European perspective. *The International Journal of Aviation Psychology, 12(3),* 263-285.

The European aviation community has sought to import Crew Resource Management (CRM) as a culturally viable training option for European aviators. The European Commission and the European Joint Aviation Authorities have sought to establish a behavioral marker system for measuring nontechnical skills (NTS) resulting in the NOTECHS framework. The Joint Aviation Requirements and Translation Elaboration of Legislation (JARTEL) project was constructed to test the usability and viability of the NOTECHS training.

The NOTECHS framework is composed of four categories including cooperation, leadership and management skills, situation awareness, and decision-making. Each category is

divided into elements relevant to safe flight operations. Communication is acknowledged as significant but is treated as an element of each of the four categories. The JARTEL project involved 105 instructors from 14 European airlines. Each instructor was given a short training session to use the NOTECHS system. The instructor pilots were assigned 8 video scenarios from a flight simulator and were to rate the CRM skills of the captain and first officer. Some scenarios presented clear CRM behavior and other scenarios presented ambiguous behavior.

Findings indicated the NOTECHS training was effective in helping raters to identify CRM behaviors in captains and first officers. The ambiguous scenarios proved more difficult for raters to identify. The researchers suggested that intense NOTECHS training would likely increase the level of consistency and improve reliability. Some airlines have already adopted components of NOTECHS in their current training. The authors offered this experimental phase has proven the value of this training package and has resulted in broad acceptance by European instructor groups.

51. **Oser, R.L., Salas, E., Merket, D.C., Walwanis, M.M., & Bergondy, M.L. (2000). Can applied research help naval aviation?: Lessons learned implementing crew resource management training in the Navy.** *Transportation Human Factors, 2(4),* **331-345.**

Oser et al. proposed that Crew Resource Management (CRM) improves performance among CRM-trained crews. The authors began by citing mishap analysis from commercial aviation where 60% - 80% of airline accidents were attributed to human error. The authors provided an in-depth review of CRM training and delivery methods.

The authors admitted that CRM training must be adapted to fit the contextual demands where it is applied. However, research has been conducted in an effort to identify methods that would generally apply to all contexts when CRM development is underway. Steps for designing and delivering CRM training are suggested and include: a) identify operational/mission requirements, b) assess team training needs and coordination demand, c) identify teamwork competencies and knowledge, skills, and attitudes, d) determine training objectives, e) determine instructional delivery method, f) design scenario exercises and create opportunities for practice, g) develop performance assessment/measurement tools, h) design and tailor tools for feedback, and i) evaluate the extent of improved teamwork in the cockpit.

Oser et al. reported lessons that can be gleaned from their study of naval aviators. Practical suggestions are made for implementing CRM training including the need for clear communication, congruence between operational requirements and theory, and real-time application of CRM skills. The authors concluded their study by noting that military aviation is not a static environment. They suggested that aviators revisit CRM training at least once a year. Just as technology and the demands of cooperation change so will the need for further research in CRM. Future research can focus on the need for new constructs, measuring devices, and delivery methods.

52. Paris, C.R., Salas, E., & Cannon-Bowers, J.A. (2000). Teamwork in multi-person systems: A review and analysis. *Ergonomics, 43(8)*, 1052-1075.

Organizations such as the military are continually searching for ways to improve teamwork among Soldiers. The authors proposed that three factors are imperative in order to have successful teams and these include team selection, task design, and team training. Team selection consists of team composition and matching individual traits of prospective members with the needs of the team before offering membership. Individual traits are important because of the limitations of team size, the need to have "trainable" members, and the desire to predict productivity, understanding that the ability of the least capable member will influence team productivity.

Task design is concerned with attempting to determine beforehand if the team task could potentially diminish productivity and to find ways to mitigate this factor from the beginning of team functioning. Factors related to task design include automation, time pressure, workload, regulations, organizational policies, etc. Team structure can also exert tremendous influence if the members perceive physical or psychological "distance" from each other, if team modalities for communication are not effective, and if members are successfully accomplishing those tasks allocated to them by the team.

Team training provides for ongoing skills development. Practicing standard operating procedures reinforces member role behavior and rehearsing these skills can improve the ability of members to respond to crisis. Performance feedback is critical for effective team training because it allows for assessment and adjustments. Developing effective communication provides for situational awareness that is critical for maintaining teamwork as the team's environment can experience unexpected shifts in stress.

53. Ployhart, R.E., Lim, B., & Chan, K. (2001). Exploring relations between typical and maximum performance ratings and the five factor model of personality. *Personnel Psychology, 54, 809-843*.

Do the demands of increased workload (i.e., maximum performance) require different personality characteristics in leadership styles than under normal (i.e., typical) conditions? This study employed 1,259 East Asian military personnel in basic training to determine if the personality characteristics of transformational leadership allow for a distinction between typical and maximum performance. The authors described transformational leadership as the ability "to create a shared vision and inspire followers to achieve more than they believed possible." Transformational leadership was identified as preferable to transactional leadership, leading by directives joined with rewards or punishment, when the team encounters changing conditions.

Subjects were given the NEO-PI-R to identify personality characteristics across the five domains of the five-factor model (FFM). The FFM consists of the constructs Neuroticism, Extroversion, Openness to new experiences, Agreeableness, and Conscientiousness. Past research is mixed and limited in reporting a significant link between the constructs of the FFM and transformational leadership.

Findings indicated that a distinction between typical performance and maximum performance can be made. Extraversion and Openness to new experiences predicted maximum performance while Extraversion and Neuroticism predicted typical performance. Fourth, the effect sizes for the FFM were stronger for maximum performance. Fifth, the findings indicated generalizabilty since the sample was drawn from a different culture than previous studies.

The authors concluded that transformational leadership is likely the leadership style organizations and the military needs to give training attention. A link likely did exist between personality and transformational leadership and this relationship is most evident under maximum performance conditions. Future research should consider testing the validity and reliability of the rating measures used in this study. Future findings might also be influenced if the study is conducted with military personnel already functioning in the military rather than with those in basic training.

54. Popper, M. (1996). Leadership in military combat units and business organizations: A comparative psychological analysis. *Journal of Managerial Psychology, 11(1)*, 15-23.

Past studies of military and organizational leadership have sought to determine why certain leaders are successful at motivating teams to go beyond "the call of duty" while other teams are mediocre in outcomes or they fail to achieve their objectives. A distinction was discussed between leadership styles noting that transactional leadership functions on the basis of bartering for compliance while transformational leadership seeks collaboration through inspiration and motivation. Both are profitable and applicable to situations depending upon the circumstances. The author proposed that regardless of the style demonstrated effective leaders know how to bond with their followers.

Bonding was founded on a relationship of trust and recognition that the need for security and confidence in the leader are crucial. Popper suggested that effective leadership is an interpersonal process and is based upon a desire for security among followers. Popper further proposed that the bonding that occurs between leaders and followers is affective in nature.

The affective nature of the leader-follower bond was related to transference, projection, attribution, and a search for meaning. Transference is an innate desire to be "protected" by an authority figure. Projection results from subordinates adapting the leader as a symbol of attributes they seek to possess but cannot achieve in reality. Attribution involves subordinates deferring to the wisdom and the competence of the leader in knowing what to do in ambiguous situations. A search for meaning is a form of attribution and suggests a subordinate looks to the leader to confer meaning for the team through goals clarification, vision, and the use of symbols.

Military teams often experience an environment where emotional bonding between team members and leadership can make a tremendous difference in how well these teams function. These teams often experience high anxiety and risks. Subordinates seek leaders who reflect the attributes they are projecting and who offer reassurance that reduces anxiety. Effective leaders serve an affective function of providing a paternalistic symbol that recognizes the emotional processes at work within the team and who responds in a constructive way to them. When

leaders respond in this way they create a bond with followers and the level of commitment to the team is enhanced.

A distinction was made between military teams and organizational teams at this point. Organizational teams benefit from high levels of commitment from their members, but they frequently fail to gain it because the organization fails to embrace the affective needs of members. The Army seeks to build commitment through addressing the affective needs of members by stressing the uniqueness of membership in their family. The family metaphor is demonstrated in the commitment to continuously train members in skills improvement and life improvement.

55. Prinzo, O.V. (1996). *An analysis of approach control/pilot voice communications.* **(Final Report). Washington, DC: Federal Aviation Administration. (AD A317 528)**

Communication is the primary link between air traffic control and cockpit crews. Errors and miscommunication can occur in resulting in otherwise avoidable accidents. Prinzo studied communications at 3 terminal air traffic control facilities. Each transmission was coded for they type of speech act and the aviation topic. A total of 12,200 communication elements in 4,500 transmissions composed the data base. Results found that 40% of 2,500 controller communication elements contain at least 1 communication error. Pilot communication elements (n = 5,900) consisted of 59% having at least 1 communication error. Errors were discussed in terms of speech categories and types.

56. Rasker, P.C., Post, W.M., & Schraagen, J.M.C. (2000). Effects of two types of intra-team feedback on developing a shared mental model in Command & Control teams. *Ergonomics, 43(8),* **1167-1189.**

Communication is necessary if teams are to be successful. Command & Control (C & C) teams are composed of at least two members, who work together completing assigned tasks, and completion of the task requires significant interaction between the members. C & C teams often function in highly complex environments and communication primarily serves to exchange information that is needed for task execution. C & C teams endeavor to develop shared mental models so that members can anticipate the reactions to other members should workload pressures increase.

The authors examined two types of intra-team feedback that contribute to the development of shared mental models. Performance monitoring allows for correction in the team during task execution. Team self-correction evaluates team performance following task execution. Both were found to be important in two studies conducted by the authors. However, performance-monitoring teams out performed those teams practicing team self-correction.

57. Rentsch, J.R., McNeese, M.D., Pape, L.J., Burnett, D.D., Darcy, M.M., & Anesgart, M.N. (1998). *Testing the effects of team processes on team member schema similarity and team performance: Examination of the team member schema similarity model.* (AFRL-HE-WP-TR-1998-0070). Dayton, OH: Wright State University. (AD A355 525)

Team members commonly develop expectations (schemas) of their team through interaction. The focus of this research was to examine the role of schemas in teamwork processes. Team membership influences were assessed based upon similarities across six variables. Team membership influences were treated as antecedents to teamwork schema similarity. Teamwork schema similarity was conceptualized as team member teamwork schema agreement and accuracy. Teamwork schema similarity and team interaction processes were then tested as antecedents of team performance.

Results were mixed. Support was found for the link between team interaction processes and team performance. Moderate support was found for the relationship between membership influences and team interaction processes. Schema similarity received moderate support for a relationship with performance. No support was found for a link between membership influences or interaction processes as antecedents for schema similarity.

58. Rielly, R. (2001). The darker side of the force. *Military Review*, March-April, 58-64.

Cohesion is typically perceived as a positive goal or attribute of groups. Rielly suggested cohesion is a neutral force that produces similar descriptive characteristics in teams. Cohesion, then, can be a positive or a negative force. This article recounted the My Lai massacre that occurred on 16 March 1968 involving Charlie Company, 1st Battalion, 20th Infantry. Charlie Company had won numerous awards including being recognized as the best company in the battalion. Months of training had resulted in a cohesive unit. Later reviews of the incident suggested that cohesion as a unit may have developed to an unhealthy level.

The Army takes new recruits in basic training and exposes them to Army values to begin the process of replacing individual values. Following basic recruits are assigned to a unit, which becomes like a family. At this level Army Values are reinforced and the recruit is confronted with the group norms present within his or her unit. Group norms are ultimately rooted in the values of the group. If group norms begin to vary from the larger organizational norms then groups tend to adopt their own goals and rules.

Cohesion is the bond that forms between members of a unit. It produces a sense of teamwork. It often motivates a willingness to go beyond the call of duty for the sake of the group. Cohesion produces a sense of identity and offers a perception of personal value. As cohesion forms team members begin to band together around the values of the group. Reviewers believed that divergent group norms are at the core of why some military units commit crimes against targets inconsistent with Army goals. They suggested that cohesion can become negative when the group; a) forms norms contrary to the Army, b) the group forms norms close to the Army's but not exactly the same, or c) group norms change after prolonged exposure to stress or another significant emotional event.

The author concluded that two avenues should be explored in seeking to mitigate the negative influence of cohesion. First, training needs to be provided that reinforces Army values since a loss of personal or values-decay can occur over time. Second, leadership bears a responsibility to model as well as reinforce Army values so the team cannot assume its own goals and norms.

59. Rosen, L.N., Knudson, K.H., & Fancher, P. (2003). Cohesion and the culture of hypermasculinity in U.S. Army units. *Armed Forces & Society, 29(3),* **325-351.**

Increasing numbers of females are entering the military and military occupations traditionally occupied by males. Some research suggests that the presence of females in military units detracts from cohesive bonding typically found in all male units. The researchers expanded upon Morris' theory that hypermasculinity in the military has led to an objectification or denigration of women as reflected in her analysis of rape cases in the military verses civilian cases. In other crime areas the difference was significant, but the number of rapes was less than other crimes. Morris proposed that the inclusion of women in all aspects of the training and occupational environment of the military would replace hypermasculinity.

Rosen et al. acknowledged the considerable body of research that suggests that all-male groups generally incorporate hypermasculinity when forming cohesion. However, they hypothesized that a culture characterized by hypermasculinity can co-exist with one that respects women. This occurs through compartmentalization, but this is difficult to develop and maintain when the influence of work and family spill over into each other.

Findings indicated that the presence of women in units changes men's perceptions of the level of hypermasculinity in the unit. Men in male-only units reported higher levels of group hypermasculinity than men from mixed-gender groups. Field-duty time was correlated with group hypermasculinity in all groups. Field-duty was also associated with decreased acceptance of women and likely decreases the climate of ungendered professionalism. The findings supported Morris's perspective on hypermasculinity.

The researchers concluded that gender integration can be a difficult task for Army units. Women can encounter conflicts between work and family that contribute to negative stereotypical perceptions by men. However, negativity towards women is not indicative of all hypermasculine groups. Rosen et al. suggested that the presence of women in a unit can decrease hypermasculinity through positive task-related and interpersonal interaction.

60. Salas, E., Burke, C.S., & Cannon-Bowers, J.A. (2000). Teamwork: Emerging principles. *International Journal of Management Reviews, 2(4),* **339-357.**

The authors put forward that aviation mishaps are possible when teamwork breaks down in the cockpit. Salas et al. cite the mishap report of the 1978 crash United Airlines Flight 232 near Portland. The National Transportation Safety Board noted that a breakdown in teamwork was the primary cause of the accident. Teamwork is defined as two or more people working interdependently towards a common and valued goal.

The authors conducted a literature review to identify principles related to developing cooperation and teamwork within teams. Seven principles emerged as significant characteristics that enable effective teamwork to develop. These seven principles include: 1) Teamwork is characterized by a set of flexible and adaptive behaviors, cognitions, and attitudes; 2) Teamwork requires that members monitor each others' behaviors and action and feel free to provide and accept feedback based on monitoring behavior; 3) Teamwork is characterized by members being willing and able to back fellow members up during operations; 4) Teamwork involves clear and concise communication; 5) Teamwork require coordination of collective interdependent action; 6) Teamwork requires leadership that enables the direction, planning, distribution, and coordination of activities; and 7) Teamwork is influenced by the context and the task requirements.

61. Salas, E., Burke, C.S., Bowers, C.A., & Wilson, K.A. (2001). Team training in the skies: Does crew resource management (CRM) training work? *Human Factors, 43(4),* 641-674.

Human error reportedly plays an important role in aviation accidents and mishaps. Much of human error has been attributed to coordination failures among the crew. Crew Resource Management (CRM) was developed to help provide training that will mitigate the effects of crew coordination errors. This study provides a brief developmental history of CRM over the past two decades and examines the effectiveness of CRM training based upon published reviews of CRM training.

The history of CRM is categorized in terms of generations. The first generation of CRM focused on the influence of individual personality factors and behaviors with a heavy emphasis on personality testing. The second generation focused on group dynamics and flight operation concepts. The third generation expanded training emphasis to include the broader aviation system outside of the cockpit that influences team performance. The fourth generation focused on integration and proceduralization including the introduction of simulation or line-oriented flight training (LOFT). The fifth and latest generation of CRM has adopted a position that human error is impossible to eradicate so the emphasis has shifted to minimizing human error and seeking to learn from it.

Fifty-eight published accounts of CRM were analyzed to determine if research supported the value of CRM training. A four-tier hierarchy of evaluation structured how the reports were categorized in terms of usefulness. The levels included; a) reaction evidence, b) learning evidence, c) behavioral evidence, and d) evidence of organizational impact. Reaction evidence was primarily based upon participant self-reports of their opinion of CRM training in general. Reaction evidence represented 27 of the 58 studies or 46%. The value of this level is it provides an initial indication of whether the participant will continue to pursue or possibly practice CRM behaviors in the future. Learning evidence involves informational or attitudinal changes. This level of evaluation accounted for 30 of the 58 reports or 52%. This level of evaluation offered benefits in addition to simple responses because it suggested actual cognitive and affective shifts in the individual. The authors noted that while this is beneficial a higher level of evaluation needs to be employed to assess knowledge structures formed by the training.

Fifty-five percent of the studies (32 of 58) gathered behavioral data. The most common format for gathering CRM behavioral data was the use of simulation such as LOFT. The evidence suggested, primarily through LOFT or similar evaluations, that CRM does have an impact on crew behavior. This is promising since it increases the likelihood that teamwork will increase while crew errors decrease. Evidence of organizational impact is more difficult to examine. This fourth and highest level was found in only 6 or the 58 programs analyzed. Much of the evidence came from anecdotal evidence or longitudinal studies because these studies are difficult, time consuming, and expensive. The authors cited a trend in these six studies towards supporting the benefit of CRM but refused to posit that such evidence definitely exists at a significant level supporting the CRM prevents accidents. Instead they offered that further study needs to be done at the organizational level and training programs need to adapt as further findings identify areas of concern.

62. **Salas, E., Burke, C.S., & Samman, S.N. (2001). Understanding command and control teams operating in complex environments.** *Information Knowledge Systems Management (2)*, **311-323.**

Military aircrews often operate in high risk, high stress environments. A high degree of cooperation and coordination are required to maintain crew safety and achieve mission success. Aircrews have been described as command-and-control teams because they are composed of highly skilled individuals, operating in a high-risk environment, with assigned tasks, and who work interdependently towards a common goal. Command-and-control teams rely on effective and efficient decision-making employing situation awareness, planning, and plan implementation.

Salas et al. offered seven principles that characterize effective command-and-control teams. These principles are: 1) Command-and-control teams must have clear, communication strategies to enable member coordination; 2) They must hold a common understanding of the coordination requirements; 3) Team leadership is needed to direct, plan, promote, distribute, and coordinate member activities; 4) Members engage in cue situation assessment and pattern recognition; 5) Shared situation awareness is a key process that enables team members to hold a common picture of the problem at hand; 6) Members must be able to dynamically exchange resources and information; and 7) Command-and-control teams must engage in performance monitoring and back-up behavior to accomplish their mission.

The authors concluded by identifying four challenges that confront efforts to build command-and-control teams. These challenges include; a) promotion and maintenance of shared cognition, b) sense-making at a distance, c) creating team synergy, and d) promotion of trust. The authors called for further research given the changing nature of technology.

63. **Salas, E., Fowlkes, J.E., Stout, R.J., Milanovich, D.M., & Prince, C. (1999). Does CRM training improve teamwork skills in the cockpit? Two evaluation studies.** *Human Factors, 41(2)*, **326-343.**

Cohesion and teamwork are essential to mission success. Teams provide the diverse skills that are needed to complete tasks successfully. Teamwork requires training in the knowledge,

skills, and attitudes (KSAs) required for teamwork to be effective. Crew Resource Management (CRM) has been offered as one training approach for developing teamwork and cohesion within aircrews. CRM includes seven skills: communication, decision-making, leadership, situation awareness, mission analysis, assertiveness, and adaptability/flexibility. Unfortunately, empirical support is limited for the effectiveness of this training.

Salas et al. studied 96 experienced naval aviators from Navy transport helicopter squadrons. The seven CRM skills were reduced to four for the sake of time and included: communication, assertiveness, mission analysis, and situation awareness. CRM training was delivered in a classroom setting employing lecture, mishap reviews, and feedback. Participants were required to complete a high workload flight scenario to rate crew behavior. A multiple test exam was given to determine participant knowledge of CRM skills.

Results found that CRM competence in the four skills utilized for this study indicated that the training was effective in improving crew performance. The trained group demonstrated more positive attitudes towards teamwork and reported greater knowledge of teamwork principles and outperformed baseline teams that did not receive the training. The researchers recognized a likely causal relationship between CRM training and performance, but are careful to not overstate the significance of this relationship without further research.

64. **Shamir, B., Brainin, E., Zakay, E., & Popper, M. (2000). Perceived combat readiness as collective efficacy: Individual- and group-level analysis.** *Military Psychology, 12(2),* **15-20.**

Unit perceptions of combat readiness can be an important influence upon unit performance and morale. The presumption is that morale and perceptions about the team develop in response to the collective efficacy beliefs held by team members. Collective efficacy is a belief held by team members that the team to be successful. These beliefs develop as members assess unit resources including member skills, experience, capabilities, and the quality of leadership.

This study distributed questionnaires to members of 50 companies in the Israeli military. Company leaders (n = 50), staff members (n = 353), and two samples of Soldiers (n = 1,197) made up the study. Three measures used were combat readiness, unit discipline, and identification with unit. The questionnaire created for the study addressed collective efficacy beliefs, identification with unit, unit discipline, confidence in leader, leader's confidence in the unit, unit Soldier's experience, and tenure of leader in the company.

Findings indicated a connection between some of these variables and perceptions of combat readiness. The stability of leader-unit relationship in terms of leader tenure and the length of membership for members was related to perceptions of combat readiness at the individual and group level. Member identification with the unit proved to be related to perceptions of readiness at both levels. The level of confidence in leadership was significant for Soldiers as an influence upon their perceptions of the unit. Unit discipline was significant at the individual level but not at the group level of analysis. Differences were noted in the standards utilized by staff members and Soldiers in determining their perceptions of combat readiness.

The authors concluded that there does appear to be a link between the collective efficacy beliefs of a unit and perceptions of combat readiness. Identification with the group and confidence in leadership seemed to be important factors in shaping efficacy beliefs. The suggestion is made that leaders can bolster the efficacy beliefs of their units by using symbols that emphasize group identity, emphasizing shared values and goals, and by engaging in inclusive behavior.

65. Siebold, G.L. (1999). The evolution of the measurement of cohesion. *Military Psychology, 11(1), 5-26.*

Cohesion is much easier to define in the abstract than to settle on one definition that concretely applies to all teams and organizations. The challenge in seeking to define cohesion has led some to suggest that definitions of cohesion need multidimensional consideration including time, the nature of the team, and the environmental or organizational context where the team functions. A similar evolution in defining cohesion has occurred in the military.

Definitions of military cohesion have witnessed an evolution since the exploits of empires such as the Greeks. The Greeks have recorded the exploits of outnumbered armies seizing victory because of their ability to function as a unit. Much of the information concerning cohesion is anecdotal at this point but the Twentieth Century witnessed the development of cohesion, to some degree, as a functional construct rather than simply an abstract description of group behavior.

World War II witnessed renewed interest in cohesion research. Early research began by introducing the idea that groups should be treated as an entity separate from the individual. As such, groups can create qualities that serve to promote teamwork or diminish the ability of units to function in response to stress. For example, one study of combat units found that cohesion was related to the level of connection with the unit.

Connection with the team is cultivated by units providing for the Soldiers' basic physical needs, providing affection and esteem for leaders, encouraging peer bonding, giving the Soldiers a sense of power, and regulating relationships with higher authority. Units meeting these criteria were found to minimize the self-concern of members. Studies such as this one and historical accounts lay the foundation of factors that should be considered when seeking to examine cohesion including pride, a sense of purpose, mutual trust, skill, confidence, teamwork, and leadership to name a few.

A beginning point in studying cohesion among groups was to establish the validity of examining groups as an entity separate from the individual. Kurt Lewin and others were the first to introduce scientific measurement in the study of groups as they charted the interactions between group members in terms of those most popular and those least popular. Group structures could be identified and related to other variables.

Small group research continued over the next three decades. The research was valuable as it further popularized the concept of researching small groups and attempts were made to introduce numerous variables such as conformity, decision-making, and social influence. New

organizational settings became available that provided additional subjects for research. However, the research approach was limited because cohesion was vaguely defined and only measured it in terms of the attractiveness of the group. Unfortunately, this type of research was of limited value in terms of military cohesion because group attraction is not a primary factor.

Research of military cohesion began to emerge in the 1980s. The Walter Reed Army Institute of Research (WRAIR) examined cohesion from a medical model (i.e., identify symptoms, make a diagnosis, prescribe a treatment, and follow up). WRAIR researchers describe cohesive groups as showing interdependence, trust, affection, and loyalty among group members. Cohesion is an emergent property resulting from member interactions, common experiences, and the development of shared features (e.g., values, knowledge, language).

Much of the WRAIR research has focused on evaluating the Army's COHORT (cohesion, operational readiness, and training) Manning System. The COHORT system was based upon keeping the same Soldiers together for their entire tour of duty and under the same leaders. The belief is this program will enhance cohesion development through maintaining member stability within the unit. Follow up questionnaires attempted to measure "Soldier will" (company combat confidence, small unit command confidence, senior command confidence, concerned leadership, sense of pride, unit teamwork, and unit social climate) perceptions. Findings indicated that members of COHORT units generally scored higher on "Soldier will" scales than members of non-COHORT members.

The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) contributed to the evolution of cohesion research by emphasizing the importance of training in building teamwork or coordination. ARI's behavioral approach adopted four transitions in their study of how to develop and maintain cohesion at the unit level. First, the focus of research moved from the company level to the squad or platoon level. Second, dynamics related to cohesion were identified and these became the focus of an ongoing commitment to developing training tools, measures, and leadership development training. Third, ARI developed unit-level measures and employed objective external performance raters. Fourth, ARI measures were not based upon self-reports by participants but the participants were assigned the task of rating the unit.

Military teams experience norms unlike most organizations. ARI definitions of military cohesion recognize the uniqueness of military teams and the social controls they possess that govern member actions and relationships. ARI posits that cohesion occurs in three forms (organizational, horizontal, and vertical). Organizational cohesion includes shared values, common goals, pride, and the attainment of needs. Horizontal cohesion involves peer bonding and teamwork. Vertical cohesion is demonstrated in perceptions of leader caring and leader confidence.

One finding of note by ARI researchers is that unit leadership will have a significant influence upon whether cohesion and training will result in enhanced performance. Unit leaders create the learning climate of their unit. Studies support that units with a strong learning climate reap higher performance from unit cohesion. The learning climate forms in reaction to the

leader's establishment of norms and values emphasizing Soldier training as opposed to those norms focusing simply on factors such as obedience.

Siebold concludes that further research is warranted given the importance of the subject. One suggestion is to determine a definition of cohesion that most in the field can agree upon and develop measures that validate the definition. Future research of cohesion holds merit and suggests the evolution of our conceptualization of cohesion will continue.

66. Smith-Jentsch, K.A., Salas, E., & Brannick, M.T. (2001). To transfer or not to transfer? Investigating the combined effects of trainee characteristics, team leader support, and team climate. *Journal of Applied Psychology, 86(2)*, 279-292.

The components of teamwork training are often taught in a classroom environment. This study sought to determine to what extent classroom training transfers to the cockpit. Specifically, Smith-Jentsch and colleagues examined factors that might influence or limit the transfer of training. Two groups of aviator trainees were studied in a simulation exercise. Both teams were provided training in assertiveness. A maximum performance group was fully informed concerning the skills being assessed and the fact that their teammates were confederates. This team was told they would be assessed based solely on their ability to use an assertiveness response to situations presented to them by instructors playing the role of captains. A typical performance group was simply told to coordinate their activities with their teammates to the best of their ability. Responses from this team were left to the discretion of the participant. Members of the typical performance group were further told that their teammates were assesses as they were.

Results highlighted the importance of leader support for transferring skills to the cockpit. Typical performance teams with supportive leaders demonstrated the use of skills comparable to the skills demonstrated in maximum performance teams. In contrast, typical performance teams with low leader transfer climate support demonstrated fewer skills than the maximum performance teams. One explanation is that scores on an assertive personality inventory possibly influenced member perceptions of the transfer climate of the team. Those scoring higher on this inventory typically rated the transfer climate of the team as more supportive. Perceptions of transfer climate had a greater impact on the behavior of those participants reporting a more external locus of control.

67. Spiszer, J.M. (1999). Leadership and combat motivation: The critical task. *Military Review, 79(3)*, 66-70.

What role do leaders play in motivating individuals to fight as a cohesive unit? The authors examined this question by defining battlefield leadership and combat motivation. He discussed the leader's responsibility to maintain morale and direct efforts to increase unit cohesion. The author concluded by listing numerous methods by which unit leaders and senior leaders can enhance cohesion and inspire combat motivation. Unit leaders are responsible for physical training, skills training and development, and Soldier workload issues. Senior leaders can improve cohesion by adopting policies, providing training, and procuring the necessary resources that support realistic training and seeks to lighten the Soldiers workload.

68. Sumer, H.C., Sumer, N., Demirutku, K., & Cifci, O. S. (2001). Using a personality-oriented job analysis to identify attributes to be assessed in officer selection. *Military Psychology, 13(3), 129-146.*

Personality can influence the quality of leadership that will develop in officer candidates. Two studies were conducted in an attempt to identify personality traits that likely lead to leadership success. The first study involved 78 current and former officers from the Turkish military. These participants listed attributes they perceived as important in leadership. A panel of 447 military officers rated their suggestion in terms of importance and relevance. Their lists resulted in a comprehensive list of 72 attributes with conscientiousness, respect, honesty, orderliness, military discipline, adaptability, and planning ability.

A second study included 447 surveys to identify personality composites related to specific jobs. Five personality dimensions emerged as significant: a) Conscientiousness-Self-discipline, b) Military Factor, c) Self-Confidence, d) Agreeableness-Extraversion, and e) Leadership. These five dimensions remained consistently strong as a comprehensive model through additionally testing. Future research is needed to possibly seek validation for this model or to attempt to create an exportable package complete with objective measures for this model.

69. Thomas, J.L., Dickson, M.W., & Bliese, P.D. (2001). Values predicting leader performance in the U.S. Army Reserve Officer Training Corps Assessment Center: Evidence for a personality-mediated model. *The Leadership Quarterly, 12,* 181-196.

Do leader values and motivation influence how others rate leaders? The authors examined the interrelationships between motives and values, personality, and rated leadership performance in a military assessment center with Reserve Officer Training Corps (ROTC) cadets. The role of power and affiliation are examined since they have been found to influence leader effectiveness.

The participants in this study were 818 ROTC cadets. Data was collected through surveys administered to volunteers from each of regiment during the first 3 days of administrative processing. The researchers determined that leader values would likely be mitigated by personality given the brief time constraints. The researchers hypothesized there would likely be a positive relationship between extraversion and leadership rating.

Findings supported the hypothesis that extraversion would be related to leadership ratings. Extraversion was positively related to leadership success as measured by leadership ratings. Individuals with high need for power and high need for affiliation were rated high in extraversion. Extraversion completely mediated the relationship between affiliation and leadership success and partially mediated the relationship between need for power and leadership.

The authors suggested that the need for affiliation is likely more pronounce for initial leadership success. However, the leader might refocus member activity on maintaining team standards that reflect directly upon team leadership. The Assessment Center setting of this study may potentially serve to artificially increase affiliation needs beyond levels normally experienced at the university level.

Power needs may be more significant to leaders and raters due to the hierarchal nature of military leadership. The authors noted that they did not consider activity inhibition, that is, the restraint of using power to meet personal needs rather than organizational goals. The authors suggested that long-term assessment would be beneficial to see if leadership ratings would change under "normal" conditions. The conclusion is that individuals who value power and who have the ability to affectively put their values into practice are likely to be considered successful leaders over time.

70. **Wiegmann, D.A., von Thaden, T.L., Mitchell, A.A., Sharma, G., & Zhang, H. (2003).** *Development and initial validation of a safety culture survey for commercial aviation.* **(FAA Technical Report AHFD-03-3/FAA-03-1). Washington, DC: Federal Aviation Administration.**

High-risk teams such as aircrews stand to benefit from an organizational commitment to develop safety cultures. The authors examined safety culture research published between 1974 and 2001. Their examination revealed 107 studies. The studies were reduced to 30 that addressed organizational culture and safety culture. Five components identified as indicators of safety culture serve as the framework of their study. These components include Organizational Commitment, Management Involvement, Reward System, Employee Empowerment, and Reward Systems.

The study employed the Commercial Aviation Safety Survey (CASS). One hundred and eight surveys were distributed to pilots (n = 93) and management/supervisory personnel (n = 15). Forty-three surveys were returned. Results found support for the CASS as a measure of safety culture. The safety culture was found to be strongest in the areas of Organizational Commitment and Employee Empowerment. Reward Systems was the weakest area. An area for improvement involves inconsistency and discrepancies related to consequences for unsafe behavior. Various types of organizational safety cultures emerged representing mixed levels of effectiveness and prompting the need for further research.

71. **Winslow, D. (1999). Rites of passage and group bonding in the Canadian Airborne.** *Armed Forces & Society: An Interdisciplinary Journal, 25(3), 429–457.*

Specialized military units require a high degree of bonding and sometimes resort to unconventional means for promoting unit cohesion. One tool utilized for promoting bonding is the use of formal and informal initiation rites such as is the case with the Canadian Airborne. Canadian Airborne initiation rites basically generally occur in three stages. First, individual identity is stripped away and group identity is stressed. This process of creating homogeneous group identity motivates personal investment in the group through activities designed to encourage the adoption of group identity as a prominent value. Second, events are constructed that simulate real life and group bonding is encouraged as participants undergo testing and stress. Third, through ceremonies and ongoing camaraderie members of the Airborne Regiment retain a sense of bonding with other Airborne members even after they return to their parent regiments.

Formal initiation begins with Soldiers attending jump school. Upon successful completion the Soldier receives his jump wings and then returns to his parent regiment. The Soldier can then

apply to join the Airborne Regiment. Those selected attend Airborne Indoctrination Course (AIC) where they are introduced to the unique culture and history that help form this organization. AIC training includes reviews of parachuting skills, advanced physical fitness training and standards, and a review of military skills (e.g., rappelling, first aid, unarmed combat). A primary emphasis of this training is to provide trainees the opportunity to demonstrate trustworthiness. Completion of AIC results in a ceremony where the Airborne coin is given and group membership in an exclusive group begins. Custom dictates that the coin must be carried with the person at all times. Failure to produce the coin if requested by another Airborne member results in the individual having to buy a round of drinks for all the Airborne members who are present.

Another initiation involves the other members crayoning the first-time jumper with camouflage paint. All exposed body parts are covered in camouflage crayon. The process can be painful and the paint is difficult to remove. The jumper is required to wear this paint through out the jump exercise. The first jump is called a "cherry" jump and the first-time jumper is required to wear a symbolic red helmet. The new member is required to stand at attention while fellow members "cam" him with camouflage paint. The novice cannot respond as the paint is smeared, pressed in his ears, or rubbed hard on the face. Airborne members are encouraged to drink as a unit and in some cases to binge drink. The belief is that the over consumption of alcohol is an important part of masculine identity and promotes bonding between members.

Airborne members are historically quiet about hazing practices in Airborne units. Instead, they stress the importance of camaraderie and a willingness to accept the humiliating treatment they receive. A lack of conformity with the process is used as a screening tool. Participants who find adopting this group identity and commitment difficult are excluded from the group.

72. Yagil, D. (1995). *A study of cohesion and other factors of major influence on Soldiers' and unit effectiveness*. (ARI Research Note 95-11). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (AD A299 079)

Perceptions of cohesion can fluctuate at different organizational levels and in the presence of other variables. Yagil reported a strong correlation between cohesion and performance or effectiveness. Professionalism was measured and the correlation between cohesion and performance was similar to the correlation between professionalism and effectiveness. The relationship between commanders and Soldiers appeared to be relatively less important to perceptions of unit cohesion or effectiveness. However, commanders report that maintaining these relationships was critical for their personal perceptions of individual effectiveness. The relationship between professionalism and effectiveness was cyclical in that cohesive teams normally require professionalism from their members.

As teams became more cohesive members often attribute greater value and commitment to team membership leading to higher levels of professionalism. Morale and motivation presented a cyclic relationship with cohesion and effectiveness since individuals need morale and motivation to participate in teams and they experienced greater morale and motivation, as the team experience proves positive.

Commitment to the team was influenced by factors such as professionalism, morale, and motivation. As cohesion increases so do member bonds. Vertical cohesion can diminish as horizontal cohesion increases. Vertical cohesion re-emerges as significant in teams with low morale. High stress manipulated increased levels of cohesion. Finally, cohesion seemed to encourage tenure. However, Yagil suggested that further research should examine if the relationship between tenure and levels of cohesion might reflect varying kinds of cohesion. The military often employs *temporal* teams that can experience high levels of cohesiveness in a brief time period.

73. Zaccaro, S.J., Gualtieri, J., & Minionis, D. (1995). Task cohesion as a facilitator of team decision making under temporal urgency. *Military Psychology, 7(2)*, 77-93.

The authors noted that past research indicates effective team performance requires a high degree of member interaction, coordination, and planning. This study examined the role of stress and urgency on the team's ability to make effective decisions. Temporal urgency characterized the military environment since technology and the dynamic demands of combat require swift decisions based upon limited or unprocessed information. In such cases questions can arise concerning the quality of the decisions made under these conditions.

Forty-six mixed- gendered teams of three were assigned a decision-making task of selecting the best sites in which to build oil wells based upon the information provided about well-drilling. Participants were divided into two task-cohesion teams. High task-cohesive teams were given information describing their participation outcome as crucial for future studies and an increase reward of one credit hour if they outperformed teams from a previous setting. The low task-cohesive teams were told the study was only a pilot investigation and they should not be concerned with overall team performance. No extra credit was offered to the low task-cohesion teams. Only written communication was allowed and each group was allotted a certain amount of time to complete their tasks.

The researchers hypothesized that members of high task-cohesion teams will engage in more information exchanges prior to the performance phase and during the performance period than will the low task-cohesion teams. They also hypothesized that high task-cohesive teams under temporal pressure will make quality decisions comparable to those made by high task-cohesive and low task-cohesive teams not facing time pressure. Finally, they proposed that low task-cohesive teams under high time pressure will make significantly poorer decisions than any other group.

Their findings provided support for their hypothesis that high task-cohesive teams perform just as well under time pressure as under low time pressure conditions. They were found to: a) devote more time to planning and information exchange during the planning phase and b) to communicate task-relevant information more frequently than low task-cohesive teams during performance phases. The authors acknowledged that social or interpersonal cohesion can influence team performance, but suggested that under urgency conditions the affect social cohesion will likely be limited. The authors concluded that high task-cohesion is instrumental in maintaining quality decision-making under time- constrained conditions. Task cohesion resulted

from experiencing performance success towards accomplishing goals and through the team's belief in its ability to accomplish team goals.

74. **Zaccaro, S.J., Rittman, A.L., & Marks, M.A. (2001). Team leadership.** *The Leadership Quarterly, 12*, 451-483.

Behaviors leading to effective functional leadership have not received significant attention in the literature thus far. The authors offered that effective functional leadership emerges from four general categories of activity. First, effective leaders are actively engaged in gathering and disseminating task-relevant information to the team while encouraging feedback concerning the information. Secondly, effective leaders apply the most efficient information in problem solving and reinforce team objectives by plans that are implemented. Third, effective leaders learn how to manage and motivate personnel resources by ensuring training, monitoring, and coordinating activity. Fourth, effective leaders properly manage material resources by assuring the availability of the material resources required to accomplish team goals.

Numerous factors comprise these four leadership processes. Team information gathering and dissemination includes shared mental models and collective metacognition, which influence how the team interprets information and implements it. Team motivation involves creating a sense of collective efficacy, group cohesion, and managing team emotions. Lastly, coordination of personnel and resources requires matching individual capabilities to role requirements, offering goals clarity and sufficient resources, and providing feedback of performance. The authors concluded that teams such as military units need to recognize the role that leadership plays in fostering effective teamwork since they possess a hierarchal structure that may not allow collective decision-making.

75. **Zazanis, M.M., Zaccaro, S.J., & Kilcullen, R.N. (2001). Identifying motivation and interpersonal performance using peer evaluations.** *Military Psychology, 13(2)*, 73-88.

Performance evaluations and feedback are critical to maintaining task cohesion and ensuring optimum team performance. Evaluations can be vertical (supervisory) or horizontal (peer) in etiology. The authors began with the premise that peer evaluations are reliable and predictive of future performance. However, the reason for the effectiveness of peer evaluations has not always proven clear. Zazanis and colleagues observed peer evaluations among participants (n = 329) attending Special Forces training representing active duty Soldiers and National Guard personnel. Ss were divided into squads of 10 to 14 members. SFAS staff provided performance ratings across 13 dimensions of performances and participants rated other squad members at the end of the performance period for overall contribution to the team effort.

Findings supported the assumption that current performance ratings by peers and staff would be based upon task performance. Peer rankings during the assessment phase predicted final training outcomes better than staff ratings. Peer and staff ratings of performance were similar during the training phase. Peer and staff ratings differ during the training phase with peers placing greater emphasis in interpersonal performance and motivation than task performance when predicting future on-the-job performance.